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LIFE-FATES: MEANINGFUL CATEGORIES TO ESTIMATE ANIMAL SUFFERING IN THE WILD

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ABSTRACT

The study of wild animal suffering and design of putative strategies to mitigate suffering in the wild can greatly benefit from the development of analytical and conceptual tools to measure the irregular distribution of suffering within species and natural populations. To this end, we propose a new concept, that of *life-fate*. A life-fate is a unit that operationally aggregates individuals from the same species based on the similarities of critical life events and hazards befalling them. The analytical framework based on this concept is thus one focused on categorizing major differences within the diversity of experiences that sentient individuals are exposed to during their existence. Such a framework forces a focus on the investigation of at-risk groups, or hotspots of individual suffering within a population. Additionally, the approach can provide insights into potential biological adaptations evolved in response to subsets of hazards individuals are exposed to, enable the description of the diversity and distribution of suffering within species in a systematic manner, and inform the public about a widespread, yet neglected, aspect of life in the wild (suffering) based on the notion of individual life experiences and stories – concepts easier to empathize with than mortality and morbidity figures. Finally, the concept of life-fates should also prove useful to reveal commonly hidden sources of suffering in other contexts, including those involved in the production of animal-derived products and services.

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INTRODUCTION

The harshness typical of the existential reality of so many members of our own species has often diverted attention and resources from the understanding of suffering in other organisms. Such a quest has been additionally hampered by a reluctance to accept, and the inherent difficulties to access, the private subjective experiences of nonverbal beings. This reluctance has been slowly dissipating with accumulating evidence that animals from very different phylogenetic groups have conscious experiences of their environment, others and of themselves (Le Neindre et al. 2017; Allen & Trestman 2017) and are capable of experiencing several affective states, among which are fear, sadness, frustration, despair or even grief. It makes biological sense: through the morally blind guidance of natural selection, the ability to suffer from pain and distress has likely ensured the motivation needed to prioritize adaptive behaviors based on their association with emotions of different valence (Morsella 2005; Merker 2016). As a consequence, the evolution of emotions has marked animal life with a less than desirable legacy – life in the wild is likely far from idyllic for most sentient beings (Horta 2015). Disease, parasitism, predation, accidents, violent intraspecific encounters and starvation, alone or combined, will kill most individuals before adulthood (Pianka 2011). Among the few making it to adult life, the chances of dying of old age are often negligible.

Yet, scientific enquiry into the prevalence, nature and distribution of suffering among wild animals is in its infancy. We still don't know how deep suffering is in the tree of life or the extent to which it varies among and within species, nor have we developed a formal strategy to investigate such questions (Godfrey-Smith 2016; Dawkins 2017). Developing such a strategy is critical: in the same way that the study of the overwhelming diversity and complexity of the living world has required the formulation of different classification hierarchies and frameworks to enable the understanding of relevant aspects of its workings, studying suffering in the wild and strategizing on how to mitigate it would imply firstly to operationally simplify and organize the daunting complexity embedded in the lives of sentient organisms.

To this end, we propose a new concept, that of *life-fate*. A life-fate is a unit that operationally aggregates individuals from the same species based on the similarities of critical life events and hazards befalling them. The analytical framework based on this concept is thus one focused on categorizing major differences within the diversity of experiences that sentient individuals are exposed to during their existence. Such framework should facilitate the identification of those groups of animals most vulnerable to intense suffering, and the events and factors most likely to contribute to their misfortune. Note that the evolution, prevalence and intensity of suffering across species will not be dealt with here (for related studies see Mashour & Alkire 2013). Instead, our focus is on measuring the irregular distribution of suffering within species and natural populations of presumably sentient organisms in natural conditions.

WHY NOT FOCUS ON THE MAIN SOURCES OF SUFFERING IN THE WILD?

Before explaining further our proposal, let's consider a seemingly simpler and more effective approach: the cataloguing and weighing of observable sources of suffering in the wild. Such a factor-centered approach is a perfectly valid one. In fact, it is the method of choice used in epidemiology and public health research to identify and mitigate sources of loss of quality of life in human populations. Until some decades ago smallpox was a source of great suffering in humans, so we focused on its eradication (and we fortunately succeeded [Henderson 2009]). Nowadays, with evidence pointing to a major shift in the burden of disease in developing countries (IHME 2017), from infectious to noncommunicable conditions, public health authorities are adjusting their resources to this new reality.

In wild animal populations such an approach could be used whenever feasible and for the most obvious sources of suffering: for example, forest fires likely impose excruciating pain and death to nearly all animals in affected communities, as well as further suffering derived from the resulting instability in those neighboring communities receiving the influx of displaced individuals. Therefore, 'mitigation of intense suffering in the wild' seems to be a good candidate to the list of reasons to prevent forest fires. Many

preventable diseases and parasitic infections associated with long-lasting pain and disability could also be addressed through this approach (after careful pondering of indirect and long-term consequences). Yet, as we list potential sources of widespread suffering in the natural world we can notice that many of them are much less tractable. Included here are the pain and distress inflicted for example by predation, resource scarcity, and fighting. Intervening in such cases is not only impractical, but can potentially lead to burden shifting or actually create even more suffering down the road (Tomasik 2015a[2009]; Horta 2015 [2011]). Because factor-centered interventions will be often constrained, we suggest an alternative – at times complementary – approach.

LIFE-FATE: AN INDIVIDUAL-CENTERED APPROACH

Species, communities and populations do not suffer – individuals do. It is at the individual level where cognitive and sensorial mechanisms are integrated, making the emergence of states such as joy and suffering possible. One could say that the ensemble of states, events and sensorial experiences that each sentient individual is exposed to during its existence is a complete, unique and valid measure of the worthiness of the universe (at least for that individual).

And the undisputable reality is that, within species, communities and even families there are individuals with dramatically different life experiences (Horta 2015): the existential reality of a chick who falls from the nest and spends the following days in a state of pain, fear, hunger and cold until she dies predated by ants is completely different from that of a sibling who is lucky to enjoy parental care, live long enough to find a mate, rear her own offspring, and die a rapid death. This diversity of individual experiences should, therefore, be the focus of analysis and concern, and the foundation for the development of a classification system. Such a classification can be achieved through a focus on the existential patterns that emerge from the combination of differences in the conditions and hazards experienced by individuals and differences in their phenotypes (i.e. differences in their coping capacities). We refer to such patterns as life-fates. Life-

fates thus aggregate individuals with similar life experiences and lifespans within a species.

This concept of life-fates offers a guideline for researchers in the life sciences to explore the dynamics of the life of animals by focusing on a relevant and previously neglected scientific paradigm – namely the distribution and diversity of affective states sentient individuals experience over their lifetime. For example, the use of operational life-fate categories forces a focus on the investigation of at-risk groups and the nature of major stressors affecting them, helping dissect the very nature of the hazards to which individuals are exposed. But the concept should be especially valuable for the practical purpose of potentially designing strategies to reduce suffering in the wild, by allowing the identification of those groups of individuals for which suffering is concentrated – i.e. 'hotspots' of individual suffering within a population. A factor-centered approach that seeks to identify the main sources of suffering in a population (such as fires and diseases) may miss the identification of particularly vulnerable groups if their misfortune is not widespread – even if individuals in these groups suffer disproportionately more.

A CASE-STUDY: THE LIFE FATES OF LEAR'S MACAWS

Any species for which sentience cannot be ruled out could be used to illustrate our proposed approach, so we chose the Lear's macaw (*Anodorhynchus leari*) for convenience, as we have data about its biology in the wild. This is an endangered species that lives in a semi-arid region of Brazil. It breeds only in the cavities of sandstone cliffs during the rainy season (when the licuri palm nut – their main food source – is more abundant). Based on field studies (Pacifico de Assis 2012) and personal communications with a conservationist working on this species (P. J. Alonso), we can distinguish at least the following life-fates: (i) *short and sorrowful*: newborns that have parental care discontinued, either because of the death of parents, or the parents' failure to reach the nest – often the result of a swarm of bees choosing the nest cavity entry to establish their new home. In such cases chicks dies due to starvation, experiencing a great deal of stress

due to hunger, fear and bereavement during their short existence; (ii) *casualty of the transition to the open*: after three months of growth within the deep end of burrows where they are tended by their parents, fledglings begin the risky process of approaching the cavity entrance and flapping their wings, which eventually will lead to their first flights. Yet because nest cavity edges are often sloppy, they sometimes slide and fall into the abyss. Some may be lucky enough to die a quick death, yet they can often agonize for days without parents being able to do much about it; (iii) *reproductive adult*: this group comprise individuals who manage to form pairs, establish a nesting site, and have their own brood. After several decades, aging individuals increasingly find it difficult to meet their physiological needs, ultimately weakening their defenses against competitors and predators, which eventually leads to death. As any individual that have lived long enough in the wild, they might have experienced occasional hunger, thermal discomfort and stress associated with competition for resources, but such experiences are intercalated with conditions eliciting positive affective states ; (iv) *non-reproductive adult*: similar to the previous fate, but not succeeding in finding a partner or establishing a nest (as the number of available cavities for nesting are limited and fiercely defended by established couples). Here, suffering due to bereavement might be important.

The above examples certainly do not exhaust the range of life fates that can be described for members of this species (e.g. they do not include individuals captured by traffickers), which could only be defined with more targeted research (is there, for instance, a parasite or disease still not obvious to us that affects only some individuals and leads to an important loss of welfare, hence would define a different life fate? Or, among reproductive adults, is there a group that is particularly vulnerable to disease, hunger and stress?). Still, the classification above enables a first gauge at the heterogeneity in the distribution of suffering in the population. It is interesting to note because this macaw is a charismatic species in danger of extinction, some interventions have already been implemented that help us illustrate potential means of reducing suffering in nature. For instance, some attempts at adding platforms of cement in the slopes of burrow entrances have been made that reduced considerably the chances of chicks falling off the cliffs (Stearns 1992). Although with another purpose (the conservation of the species in the wild), this is an example of an intervention that could

also be identified as necessary for reducing suffering in the wild with the life-fate approach: life-fate oriented studies could have detected that fallen chicks are a hotspot of suffering for members of this species, as they experience disproportionately long periods of agony in their short lives (provided the reduced mortality from these falls does not increase the frequency of episodes of intense suffering at later life stages due to the potentially larger population size and heavier competition for limiting resources).

LIFE-FATE BOUNDARIES: A PROTOCOL TO DELIMIT MAJOR INTRASPECIFIC DIFFERENCES IN INDIVIDUAL EXPERIENCES

In some species, life-fates can be relatively easy to identify. For instance, eusocial systems like those observed in societies of ants, termites, and some bees and wasps clearly delimit a division of reproductive roles, as well as several castes with different lifespans, activities, and even morphologies within the same sex. This phenomenon is also present in some mammals, such as naked-mole rats (Sherman 1991). In all these societies, the life experiences of a queen are radically different from those of workers, which are also different from the experiences of male breeders. But what about species in which such differences are not so evident? Would there be effective criteria to justify and guide the categorization of life-fates?

In most cases, life fates will be operational classifications requiring the conversion of continuous traits (such as lifespans) into discrete categories; therefore, hard rules are difficult to decree. Still, a general guideline is to consider two parameters: the life stage reached by the individual and major stressors they are exposed to during their lives. Going back to the macaws, if their life cycle is marked by three clearly distinct life stages (e.g., infant, young and adult) and, within each of those, there are at least two separate groups, defined by differences in their routines that affect their likelihood of suffering, then there would be a case for defining at least six life-fates. Indeed, for chicks dying in the nest, one could distinguish between those dying slowly from starvation (as previously described), and those who die suddenly (e.g. attacked by a predator such as a snake). Similarly, among fledglings transitioning to the open, we should consider a split

between those dying quickly in a fall or as the result of predation, and those dying a gruesome and slow death following multiple non-fatal injuries as the result of a fall.

Although occasionally borrowing concepts and categories used by other research frameworks to classify the life of individuals (e.g. life stage at the time of death, social rank such as subordinate and dominant), the concept of life fate moves beyond those categories. For example, life-history theory (Stearns 1992) is concerned with those heritable characteristics that affect an organism's growth, survival and reproduction. In addition to traits such as age at sexual maturity and offspring number, an individual's ability to cope with stress, competition, exploitation, and acquire critical resources is also part of its life history. Differences in life-history traits such as these will directly affect the chances that an individual ends up with one life fate or another, hence that it undergoes more or less suffering than its conspecifics. Yet understanding variability in life-history traits is not sufficient to understand the nature and distribution of suffering in the wild: phenotypic similarity will not ensure a similar life-fate.

In general, approaches used by population ecologists are useful to understand major differences in the life of populations, hence to gauge possible differences in the level of suffering across species and ecosystems. Yet they lack the resolution needed to identify the sources and nature of suffering in the wild and those individuals at the highest risk. For instance, survivorship curves are used to depict the proportion of individuals from a population surviving to each age. By providing relevant information about the distribution of lifespans in animal populations, they enable estimating the number of individuals who had their life cycles cut short, and by how much. Although enlightening when no other information is available (Tomasik 2015b), age-specific mortality is a crude proxy to estimate suffering in the wild, as it often does not consider differences in the causes of mortality, as well as in the prevalence of nonfatal harms, diseases and disabilities befalling organisms during their lifetimes.

One possible criticism against the life-fate approach relates to the research effort needed to define life fates in each and every species. There are two answers to what is certainly a valid point. First, researchers studying the natural history of one or more species would not need to divert efforts from their existing research lines – by bearing the life-fate approach in mind, they can re-organize their data in yet another way, adding

a new layer of interest to their research. Second, efforts will be likely diminishing as more species are described, since common patterns may emerge in phylogenetically closer groups and species from the same ecological guilds (namely groups of individuals exploring the same type of resources in a similar way; [Simberloff & Dayan 1991]).

A CONCEPT WITH FAR-REACHING IMPLICATIONS

The concept of life fate should also prove useful to categorize animal suffering in contexts other than the wild. For example, billions of animals are raised and killed every year for food (FAO 2017) – a context where life fates can be more easily identified for being the result of a modular arrangement inherent in industrial processes. Consider the production of eggs in barren battery cage systems. Here, at least five distinct life-fates are involved: that of male breeders, female breeders, male chicks (slaughtered with a few hours or days of life), pullets who die before sexual maturity (hence never experience life in a battery cage) and laying hens. A pound of pork meat, in turn, will include the life fate of boars (intact males used for breeding), sows (female breeders), piglets who die before weaning, and the actual meat-producing animals that end up in the supermarkets. The identification of life fates in this case not only allows putative interventions based on the mapping of hotspots of suffering in the production chain, but can also inform society of the hidden welfare costs embedded in an animal-sourced product. For every piece of meat on a plate, there will be several life fates consumers are often unaware of. In the same way, for every animal on display in a touristic attraction, there may be siblings who did not make it into adulthood, animals who died during transportation, sick and elderly individuals kept out-of-sight and breeders who may have lived in very different conditions. In general, for every wild or domesticated animal we come in contact with in one form or another, there will be many life-fates that are often unobserved. The concept of life fates makes inquiry about the suffering involved in these various contexts easier: the question “what are the life fates involved here?” is one easier to answer, that can help inform the “welfare footprint” embedded in the many enterprises involving animals.

CONCLUSION

Although the study and quantification of suffering should ideally consider the idiosyncratic experiences of all individuals, the unattainability of such a task should not prevent us from seeking a proper balance between scientific tractability and resolution. We argue that this can be achieved with the concept of life-fates and the analytical focus that this system of classification entails. The benefits of the proposed framework can be many. First, it should allow the description of the diversity and distribution of suffering within species and populations in a systematic and rigorous manner. Second, it should help identify important knowledge gaps in our understanding of the hazards befalling organisms in the wild, thus leading the way forward for further research. Third, the concept of life-fate is naturally associated with the notion of individual suffering and individual life experiences – something most people relate to much more easily than mortality and morbidity figures. This is particularly relevant in light of the well-known human tendency to disregard mass suffering and grim statistics (Cameron & Payne 2011), as opposed to the greater emotional empathy (Singer 2015) that a "face" or a "story" often evoke. Finally, the framework enables identifying the most vulnerable individuals in a population. While it is true that each of the trillions of individuals alive at any one point in time will have their own history, and their individual life course will always be unique, the fate of some individuals will lie at the extreme of a broad spectrum of possibilities, being disproportionately affected by the pressures and hazards of life in the wild. Identifying those individuals carrying the greatest burden of suffering may be crucial to prioritize putative interventions that may, one day, become feasible.

REFERENCES

Allen, C. & Trestman, M. (2017) "Animal consciousness", in Schneider, S. & Velmans, M. (eds.) *The Blackwell companion to consciousness*, Chichester: John Wiley & Sons.

Cameron, C. D. & Payne, B. K. (2011) "Escaping affect: How motivated emotion regulation creates insensitivity to mass suffering", *Journal of Personality and Social Psychology*, 100, pp. 1-15.

Dawkins, M. S. (2017) "Animal welfare with and without consciousness", *Journal of Zoology*, 301, pp. 1-10 [accessed on 27 December 2017].

Food and Agriculture Organization of the United Nations – FAO (2017) "Livestock primary data", *FAOSTAT* [accessed on 27 December 2017].

Godfrey-Smith, P. (2016) *Other minds: The octopus and the evolution of intelligent life*, New York: Farrar, Straus and Giroux.

Henderson, D. A. (2009) *Smallpox: The death of a disease*, Amherst: Prometheus.

Horta, O. (2015) "The problem of evil in nature: Evolutionary bases of the prevalence of disvalue", *Relations: Beyond Anthropocentrism*, 3, pp. 17-32 [accessed on 27 December 2017].

Institute for Health Metrics and Evaluation – IHME (2017) "Global Burden of Disease (GBD)", *IHME*, University of Washington [accessed on 29 August 2017].

Le Neindre, P.; Bernard, E.; Boissy, A.; Boivin, X.; Calandreau, L.; Delon, N.; Deputte, B.; Desmoulin-Canselier, S.; Dunier, M.; Faivre, N.; Giurfa, M.; Guichet, J.-L.; Lansade, L.; Larrère, R.; Mormède, P.; Prunet, P.; Schaal, B.; Servière, J. & Terlouw, C. (2017) "Animal consciousness", *EFSA Supporting Publications*, 14 (4) [accessed on 27 December 2017].

Mashour, G. A. & Alkire, M. T. (2013) "Evolution of consciousness: Phylogeny, ontogeny, and emergence from general anesthesia", *Proceedings of the National Academy of Sciences of the United States of America*, 110, pp. 10357-10364 [accessed on 27 December 2017].

Merker, B. (2016) "Drawing the line on pain", *Animal Sentience*, 3, 23 [accessed on 27 December 2017].

Morsella, E. (2005) "The function of phenomenal states: Supramodular interaction theory", *Psychological Review*, 112, pp. 1000-1021.

Pacifico de Assis, E. C. (2012) *Biologia reprodutiva da arara-azul-de-lear* Anodorhynchus leari *(Aves: Psittacidae) na Estação Biológica de Canudos, BA*, São Paulo: Universidade de São Paulo [accessed on 27 December 2017].

Pianka, E. R. (2011) *Evolutionary ecology*, 6th ed., New York: Harper and Row.

Sherman, P. W.; Jarvis, J. U. M. & Alexander, R. D. (eds.) (1991) *The biology of the naked mole-rat*, Princeton: Princeton University Press.

Simberloff, D. & Dayan, T. (1991) "The guild concept and the structure of ecological communities", *Annual Review of Ecology and Systematics*, 22, pp. 115-143.

Singer, P. (2015) *The most good you can do: How effective altruism is changing ideas about living ethically*, London: Yale University Press.

Stearns, S. C. (1992) *The evolution of life histories*, Oxford: Oxford University Press.

Tomasik, B. (2015) "The importance of wild-animal suffering", *Foundational Research Institute* [accessed on 31 August 2017].

Tomasik, B. (2015b) "Estimating aggregate wild-animal suffering from reproductive age and births per female", *Essays on Reducing Suffering* [accessed on 11 September 2017].