

A Universal Unit of Welfare

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Introduction

Introduction
○○○

Foundations
○○○

Units of Welfare
○○○○○○○○○○○○

HY Framework
○○○○○○○○○○

Estimating hy
○○○○○○○○○○○○

Discussion
○○○○○○○○○○○○○○○○○○○○

Goal of this Project

The goal of this project is to

- 1 gain clarity about the fundamental structure behind the question of welfare measurement
 - what are the fundamentally right questions to ask in order to measure welfare? (in principle)
 - what are the useful proxy questions to ask in order to estimate welfare? (in practice)
- 2 provide a single framework to nest all existing welfare measures (e.g., QALY, DALY, WELLBY, WALY, AQALY, SAD)
- 3 gain clarity about what we should ultimately be aiming for in welfare measurement

To do this, I am going to propose a single universal unit with which to measure welfare across all species

Notes

Note 1. We won't have time to cover all of the previous things fully.

Note 2. A lot of this will sound similar to existing concepts you may already be familiar with including: QALYs, AQALYs, moral weights, welfare ranges, etc.

Nevertheless, my hope is that the usefulness of this project will become clear by the end

Outline of Talk

- ① Foundations
- ② Units of Welfare
- ③ The HY Framework
- ④ Estimating h_y (probably not time to cover)
- ⑤ Discussion

Foundations

Introduction
○○○

Foundations
○○○

Units of Welfare
○○○○○○○○○○

HY Framework
○○○○○○○○○○

Estimating hy
○○○○○○○○○○

Discussion
○○○○○○○○○○○○○○○○

Two Objects

There are two objects that will be important for us

① experiences

- this is the fundamental object we care about
- the moral value of the world is derived from the moral value of the experiences within it
 - (this is my view, the view of the framework I propose, and the view of most welfare frameworks)
- note that an entire life is an experience

② welfare levels

- this is a number that we assign to each possible experience that represents the goodness of that experience
- a “utility” of that experience
- an “experienced utility”
- XU

Theory of XU (Experienced Utility)

This says that if we can ordinally rank experiences according to which we'd rather live in a vacuum, then there is a **unique** way of assigning numbers to these experiences that

- ① represents this ranking

experience 1 $\succeq$ experience 2

$$\iff XU(\text{experience 1}) \geq XU(\text{experience 2})$$

- ② is additive over time

$XU(\text{experience 1 followed by experience 2})$

$$= XU(\text{experience 1}) + XU(\text{experience 2})$$

Outline of Talk

- ① Foundations
 - (Ratio-scale) Welfare is a well-defined concept and comes from preferences over lived experiences
- ② Units of Welfare
- ③ The HY Framework
- ④ Estimating h_y (probably not time to cover)
- ⑤ Discussion

Units of Welfare

Introduction
○○○

Foundations
○○○

Units of Welfare
○○○○○○○○○○○○

HY Framework
○○○○○○○○○○

Estimating hy
○○○○○○○○○○○○

Discussion
○○○○○○○○○○○○○○○○○○

Units of XU

What are the units of XU?

(I've been thinking about XU for years, and it seems obvious in retrospect, but didn't understand this idea so clearly until now)

The units of XU are in experiences themselves

An experience forms a yardstick against which to measure other experiences

More precisely, any **non-zero** experience is a potential unit of welfare, just like any **non-zero** length object is a potential unit of length

Units of XU

A “zero-length” object is one in which stacking it on top of itself produces an object which is equally long

Similarly, a “zero-welfare” experience is one in which living it twice (in a vacuum with amnesia) is equally good as living it once

You can't measure the length of objects with a zero-length object, and you can't measure the quality of experiences with a zero-quality experience

Any non-zero experience is a potential unit of welfare

Intuition: Positive Experiences

Suppose our proposed “unit experience” is you eating a bite of chocolate

We want to measure the welfare of you taking a bath. Then we ask the question:

In a vacuum, how many “bite of chocolate” experiences x would it take to make you indifferent between having x bocs and the one bath experience?

Suppose the answer is 2. Then the bath contains 2 bocs (bite of chocolates) of XU

Intuition: Negative Experiences

Now suppose the bath is scalding hot and painful, so now *any* amount of bocs is preferred to the bath

This is what it means for the bath to be a *negative* experience

So how do we measure negative welfare? We ask the question:

In a vacuum, how many “bite of chocolate” experiences x would it take to make you indifferent between having 1) no experience at all, and 2) x bocs plus the one bath experience?

Suppose the answer is 3. Then the bath contains -3 bocs (bite of chocolates) of XU (it takes 3 bite of chocolate experiences to balance out the harm of the scalding hot bath)

Units of XU

Okay, now we have the intuition for why units of XU are in experiences

But what actually makes a *good* choice for this unit experience?

What Makes a Good Choice of Unit?

In my view, a good choice of unit experience is

- ① positive—it is often easier to think about positive rather than negative experiences
- ② intuitive—it is reasonably easy to imagine
- ③ real—it shouldn't be a purely hypothetical experience that the world has never seen (e.g., “the best possible human experience”)
- ④ precise or pragmatic—we can't have both, but we should definitely have one or the other

Precise-Pragmatic Spectrum

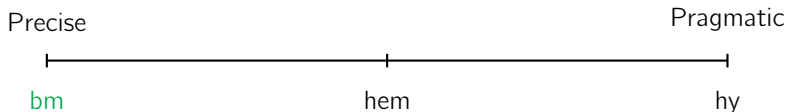
Technically, an experience specifies *everything* about that experience: who is having the experience, what is their state of mind, when is the experience happening, etc.

Your “bite of chocolate” experience isn’t a single experience, it’s a set of infinitely many experiences of you eating chocolate in different settings in different moods with different hunger levels

Given this, I will present three possible units of welfare

- 1 a fully precise unit (a single experience)
- 2 a unit that balances precision and pragmatism (a small-ish class of experiences)
- 3 a fully pragmatic unit (a large class of experiences)

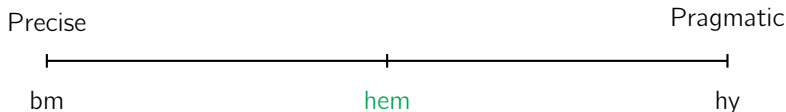
Precise-Pragmatic Spectrum: bm



Fully Precise

- To be fully precise, we need to specify everything about the (non-zero) experience
- I propose “Donald Trump eating a Big Mac on his birthday at the beach” (bm)
- This is intended to be a *single* experience, not a set of experiences, and we weigh all experiences against this single experience

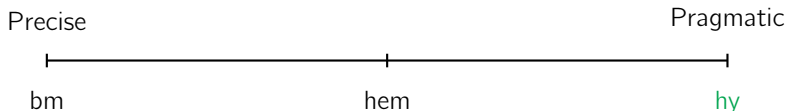
Precise-Pragmatic Spectrum: hem



Balance of Precision and Pragmatism

- To be pragmatic while still precise, we need to have a smallish class of experiences that we think are roughly similar across people
- I propose the “human equanimity minute” (hem)
- I conjecture that a minute of equanimity is roughly the same experience across people
- Precisely, this is a *set* of experiences, all of which I’m conjecturing have roughly the same XU

Precise-Pragmatic Spectrum: hy



Fully Pragmatic

- To be fully pragmatic, I propose the “happy healthy human year” (hy)
- A hy represents the experience of an average human’s life in the modern day who is broadly considered happy and healthy
- This is clearly a huge set of experiences, and the variance in XU across this set is certainly large—but I think it’s good enough for the purposes of rough welfare measurement
- It’s not fully precise (or even approximately so), but it is pragmatic and, I think, useful

Outline of Talk

① Foundations

- (Ratio-scale) Welfare is a well-defined concept and comes from preferences over lived experiences

② Units of Welfare

- Units of welfare are in experiences themselves
- A pragmatic unit of welfare is the happy healthy human year (hy)

③ The HY Framework

④ Estimating hy (probably not time to cover)

⑤ Discussion

The HY Framework

Introduction
○○○

Foundations
○○○

Units of Welfare
○○○○○○○○○○

HY Framework
○○○○○○○○○○

Estimating hy
○○○○○○○○○○

Discussion
○○○○○○○○○○○○○○○○○○

The HY Framework

The HY Framework is intended to be a **pragmatic** framework for the measurement of welfare across all sentient beings

It is built around the **happy healthy human year (hy)**

Notation

“happy healthy human” will be reduced to “h” for human and “y” stands for “year”

- hy : happy healthy human year
- hm : happy healthy human month
- hw : happy healthy human week
- hd : happy healthy human day

The HY Framework

In principle, we could just measure every experience across every species in terms of happy healthy human years (hy), and that's it

But cross-species comparisons involve one added step of reasoning and it is useful to separate that out

The HY Framework

In principle, the pair of experiences “you eating an apple” and “me eating an apple” is no more different than the pair of experiences “my dog eating an apple” and “me eating an apple”

In principle, I don’t know what it’s like to be you any more than I can know what it’s like to be my dog

But in practice, we assume similarities between species, and so practically it’s helpful to think differently experiences within each species

So let’s do that

The HY Framework

As before, we need an experience that forms a yardstick against which to measure other experiences *for each species*

What should that be?

This is the same question we had before, except for a non-human animal like a chicken, rather than a human

So the answer is the same as before:

a happy healthy chicken year (cny)

A cny represents the experience of an average chicken's life in the modern day who is broadly considered happy and healthy

Notation

“happy healthy chicken” will be reduced to “cn” for chicken and “y” stands for “year”

We will take the first and last letter for non-human animals (and just h for humans)

- hy : happy healthy human year
- hd : happy healthy human day
- cny : happy healthy chicken year
- cnd : happy healthy chicken day
- pgy : happy healthy pig year
- pgd : happy healthy pig day
- cwy : happy healthy cow year
- cwd : happy healthy cow day

Example

- What is the welfare of one day as a factory farmed chicken during their early life stage?
- Just roughly introspecting, I estimate -1 cnd
- This means it would take 1 day as a happy healthy chicken to offset the 1 day as a factory farmed chicken during their early life stage
- I would be indifferent between having no experience and having 1 day as a happy healthy chicken followed by 1 day in the early life of a factory farmed chicken

Comparing Yardsticks

Now we have the welfare of all chicken experiences measured in happy healthy chicken years (cny)

For some purposes, this is all we need

But when we want to compare across species, we need to convert things to a common unit—the happy healthy human year (hy)

How do we do that?

We need to ask ourselves how these two yardsticks compare

The answer to this question produces a *conversion factor* between a cny and a hy which I call the chicken factor (or s factor in general)

The Chicken Factor

Chicken Factor. How many happy healthy chicken years (cny) are indifferent to 1 happy healthy human year (hy)?

The HY Framework

Pragmatic welfare measurement can be broken into three steps:

- 1 Specify an appropriate unit of welfare (experience) for each species. I propose the **happy healthy s year** for species s .
- 2 Measure the welfare of experiences within each species against that yardstick by asking:
How many of this experience is indifferent to or offset by a happy healthy s year?
- 3 Select a primary yardstick with which to measure everything against. I propose the **happy healthy human year (hy)**.
Compare all yardsticks to this one by asking:
How many happy healthy s years are indifferent to 1 happy healthy human year (hy)?
I call this the **s factor**.

Estimating h_y

Introduction
○○○

Foundations
○○○

Units of Welfare
○○○○○○○○○○○○

HY Framework
○○○○○○○○○○

Estimating h_y
○○○○○○○○○○○○

Discussion
○○○○○○○○○○○○○○○○○○

Recall: Goal of this Project

The goal of this project is to

- ① gain clarity about the fundamental structure behind the question of welfare measurement
 - what are the fundamentally right questions to ask in order to measure welfare? (in principle)
 - if you buy the HY framework, we now have this
 - what are the useful proxy questions to ask in order to estimate welfare? (in practice)
 - let's now discuss this
- ② understand how existing welfare measures fit into this framework
- ③ gain clarity about what we should ultimately be aiming for in welfare measurement

How should we go about estimating h_Y ?

I will go over four approaches

Introduction
○○○

Foundations
○○○

Units of Welfare
○○○○○○○○○○○○

HY Framework
○○○○○○○○○○

Estimating h_Y
●○○○○○○○○○○

Discussion
○○○○○○○○○○○○○○○○○○

Qualitative Approach

Qualitative Approach. We know the right questions to ask.
Let's just learn all we can about the animal's life and make our
best judgement about these questions directly.

In my view, this is actually a more helpful approach than it might
seem

Qualitative Approach

WTP per hy	\$40,000		hy = happy-healthy-human year
Chicken			
Meat (lbs) / Chicken	2.5		
s factor	7.0		

Qualitative Approach

Battery-Caged Broiler Chicken					
Stage	Duration (days)	Description	XU (cnd) / Day	XU (cnd)	XU (hd)
1	14	Early life	-1.0	-14.0	-2.0
2	21	Growth period	-5.0	-105.0	-15.0
3	11	Final weeks	-6.0	-66.0	-9.4
4	1	Slaughter	-10.0	-10.0	-1.4
			Total	-195.0	-27.9
			Total / lb	-78.0	-11.1
			Corrective Subsidy / Chicken		-\$3,053
			Corrective Subsidy / lb		-\$1,221

Qualitative Approach

Furnished-Caged Broiler Chicken					
Stage	Duration (days)	Description	XU (cnd) / Day	XU (cnd)	XU (hd)
1	14	Early life	-1.0	-14.0	-2.0
2	21	Growth period	-4.0	-84.0	-12.0
3	11	Final weeks	-5.0	-55.0	-7.9
4	1	Slaughter	-10.0	-10.0	-1.4
			Total	-163.0	-23.3
			Total / lb	-65.2	-9.3
			Corrective Subsidy / Chicken		-\$2,552
			Corrective Subsidy / lb		-\$1,021

Pleasure and Pain Tracker Approach

Pleasure and Pain Tracker Approach. Track time in various states of pleasure and pain across the animal's life. Aggregate into s years (using intuition and/or surveys)

This is the method of the Welfare Footprint Institute

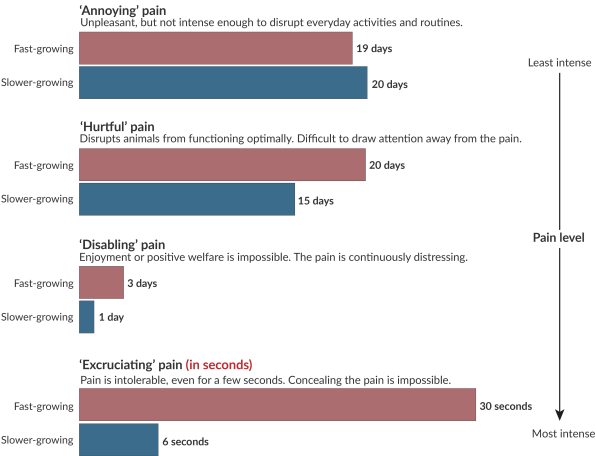
I really like this approach and think it can be very helpful

Pleasure and Pain Tracker Approach

Time that fast and slower-growing chicken breeds spend in pain over their lifespan



Estimates of the time that an average chicken raised for meat will spend in different levels of pain. Both breeds of chicken reach the same slaughter weight, just at different rates (42 versus 57 days).



Note: A 'day' is considered to be 17 hours, the 'midpoint' length of time that the average chicken is awake.
Data source: Welfare Footprint. Licensed under CC-BY by the author Hannah Ritchie.

Four Domains Approach

Four Domains Approach (nutrition, physical environment, health, behavioral interactions). Measure general characteristics of the animal's life. Aggregate into 5 years (using intuition and/or surveys)

This is the method of the AQALY paper by Espinosa, Browning, Treich (2025 WP)

I also really like this approach and think it can be very helpful

Mixed Approach

Mixed Approach. Some combination of all three.

- We can do each of the three methods and use the results to inform our understanding of the holistic problem
- If one looks differently from the others, we can inspect further to see if there are blind spots or shortcomings within any of the three

Summary: Estimating hy

- 1 **Qualitative Approach.** We know the right questions to ask. Let's just learn all we can and make our best judgement about these questions.
- 2 **Pleasure and Pain Tracker.** Track time in various states of pleasure and pain across the animal's life. Aggregate into s years (using intuition and/or surveys)
- 3 **Four Domains Approach** (nutrition, physical environment, health, behavioral interactions). Measure general characteristics of the animal's life. Aggregate into s years (using intuition and/or surveys)
- 4 **Mixed Approach.** Some combination of all three.

Discussion

Introduction
○○○

Foundations
○○○

Units of Welfare
○○○○○○○○○○○○

HY Framework
○○○○○○○○○○

Estimating hy
○○○○○○○○○○○○

Discussion
○○○○○○○○○○○○○○○○○○○○

Four Points of Discussion

- 1 Occam's Ruler
- 2 Common Terms Are Used Inconsistently
- 3 On Moral Weights
- 4 On Welfare Ranges (/Welfare Capacities/Hedonic Capacities/Utility Potentials)

Occam's Ruler

Occam's Razor. Theories should not be multiplied beyond necessity: of two competing theories, the simpler explanation is to be preferred.

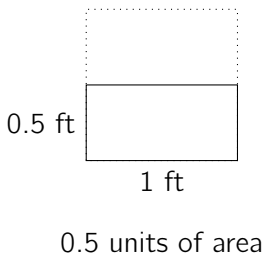
I propose the following analog for units of measure

Occam's Ruler. Units of measure should not be multiplied beyond necessity: when a unit can simply describe what it is, it should.

Occam's Ruler: Illustration

Suppose we want a unit of measure for area

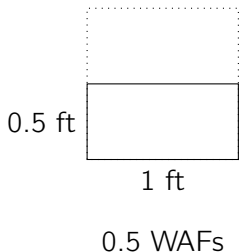
Notice that any area can be equivalently represented by a rectangle with a 1 ft length and some width w —and hence that we can measure the area of any object as precisely that w



What should we call this unit?

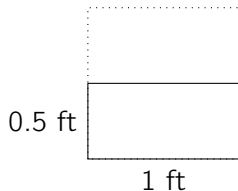
Occam's Ruler: Illustration

A QALY is a life year with an adjusted quality—quality-adjusted life year (QALY).



Method 1 (QALY Analogue). This object is a rectangle of length 1 with an adjusted width. So let's call it 0.5 WAFs (width-adjusted foot).

Occam's Ruler: Illustration



0.5 square feet

Method 2 (Occam's Ruler). If the name of the unit itself is simple, use it. The unit is some fraction of a square foot. So let's call it 0.5 square feet.

Like a square foot, a happy healthy human year satisfies Occam's Ruler—it simply describes what it is.

Occam's Ruler: Conclusion

When possible, we should call units what they are: hy rather than QALY (or similar)

Common Terms Are Used Inconsistently

Across the EA forum, Welfare Footprint Institute, Treich (2025) *Animal Economics*, Fischer (2024) *Weighing Animal Welfare*, Charity Entrepreneurship's SAD framework

the terms moral weights, welfare ranges, hedonic capacities, and utility potentials

are often used to mean different things.

As a result, I find these concepts especially confusing, and probably some other readers too

On Moral Weights

In Fischer (2024) *Weighing Animal Welfare*, moral weights are used to morally compare chicken welfare (measured in chicken welfare units) to human welfare (measured in human welfare units)

In the text, there is an illustrative example where we suppose “the value of 100 chicken QALYs is equivalent to 1 human QALY”, and hence the moral weight on chicken welfare is $1/100$ relative to human welfare

I believe that moral weights should be used to morally compare chicken welfare and human welfare which **are already measured in the same units** (and not be used as a mere conversion factor between units)

Let's see why with an example analogous to this one

On Moral Weights

Suppose welfare benefits of a policy change are measured in monetary units of the local currency

Suppose “the value of a Japanese policy with 100 Japanese yen of benefits is deemed morally equivalent to a US policy with 1 US dollar of benefits” (this is roughly the actual exchange rate)

Then under the moral weight definition in Fischer (2024), the moral weight on Japanese people’s welfare is $1/100$ relative to American people’s welfare

I don’t think this captures what we want out of a moral weight

In both the chicken vs human and Japanese vs American cases, the moral weight is $1/100$ because of the different units being used for each group, not because we value the welfare measured in the same units differently between each group

On Moral Weights

Under the Fischer (2024) definition of moral weights, a utilitarian has moral weights equal to the **s factor**

- moral weighting consists both of converting different welfare units to the same unit *and* of weighting those units morally, but utilitarians value all welfare units equally, so moral weight is just s factor

Under my definition of moral weights (which is not unique to me, Treich (2025) has the same definition), a utilitarian has all moral weights equal to **1**

- once we have everything in the same unit, all species are morally valued the same, so the moral weight is just 1

On Welfare Ranges

In Fischer (2024) *Weighing Animal Welfare*, **welfare ranges** are defined as follows:

“An individual’s welfare range is the difference between the best and worst welfare levels that the individual can realize, where the relevant possibilities are something like the realistic biological possibilities for that individual.” (p. 47)

On Welfare Ranges: Point 1

Point 1. If we measure welfare relative to the upper bound, the lower bound doesn't matter.

- Let the “best” human experience be M (for max). By definition, the experience M has 1 M of welfare.
- We compare any experience A to M by asking the following questions.
- If A is a positive experience, we ask how many A experiences would it take to be indifferent to M ?
 - For example, if the answer is 2, the welfare of A is $0.5 M$.
- If A is a negative experience, we ask how many A experiences would it take to offset M .
 - For example, if the answer is 2, the welfare of A is $-0.5 M$.

Notice the lower bound plays no role.

On Welfare Ranges: Point 1

If we do this for each species—measuring its welfare relative to its “best” experience—then the conversion factor we need is simply a comparison of the “best” human experience to the “best” chicken experience

The lower bound, and hence the “welfare range” (the gap between the “best” and “worst” experience), doesn’t matter.

On Welfare Ranges: Point 2

Point 2. We should measure welfare relative to an intuitive experience, and the “best biological” experience is not so intuitive.

We want to compare the experience of some minute in the life of a human to a particular human experience (the yardstick)

Option 1. We compare human experiences to a “happy and healthy human minute” (the average minute of a happy and healthy human).

Option 2. We compare human experiences to the “best realistic biologically possible human minute”.

In my view, Option 1 is more intuitive than Option 2, which is likely something you and I have never experienced

On Welfare Ranges: Point 2

Moreover, even if I *could* imagine the “best realistic biologically possible human minute” as easily as “an average happy healthy human minute”, I find that a weird scale to measure things on

In particular, the welfare units will all be extremely low

- The best hour of my life might be < 0.1 welfare units per minute (each minute is on average $< 1/10$ of the best human minute)
- A peaceful relaxed state might be < 0.01 welfare units per minute
- And an extremely painful experience might be around -0.1 welfare units per minute

Four Points

- ① Occam's Ruler
 - When possible, we should call units what they are. E.g., hy rather than QALY (or similar)
- ② Common Terms Are Used Inconsistently
 - (moral weights, welfare ranges, hedonic capacities, and utility potentials)
- ③ On Moral Weights
 - Moral weights should be applied to welfare units that are already on the same scale.
- ④ On Welfare Ranges (/Welfare Capacities/Hedonic Capacities/Utility Potentials)
 - Welfare ranges (/Welfare Capacities/Hedonic Capacities/Utility Potentials) are not necessary for welfare measurement.

Thank you for listening!

Questions, comments, or concerns?