

Economic Betterment (Value): Are all betterments commensurable? Can you compare your relief from less global warming with more anxiety at work? the loss of a friend? or, even, the stress of a longer commute?

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Comments appreciated.

Abstract: The choice theory that supports the valuation of ecological and environmental resources assumes you have a complete ranking of paths (states-of-the-world) in terms of betterment. Assumption: *Experiencing a higher-ranked path is better for you, from your perspective, than experiencing a lower-ranked path.* Where: *Every path for you is a conceivable life-path and world as it would unfold through time, including its ecological resources.* Having a ranking of paths requires that all of your different feelings and thoughts are commensurable in terms of how they affect your overall betterment (all types of betterments and worsements collapse onto one dimension). Even if you know in what way and to what extent each aspect of each conceivable path better you, it is still a stretch to assume—which you do—that it is always possible to collapse all betterments onto one dimension. For example, you must be able to compare the betterment caused by dates with Alex with the betterment caused by saving gorillas, with the betterment caused by freedom to practice your religion. In opposition to neoclassical choice theory, many people reject complete benefit-commensurability. This note summarizes the arguments and findings in the context of environmental and ecological resources

Keywords: betterments and bearers-of-betterments, value, incomparable and incommensurable, a ranking based on betterment, betterment/bearer separability, neuroeconomics, the striatum, and the ventromedial prefrontal cortex

*Weak comparability of values as a foundation for ecological economics (Martinez-Alier<sup>1</sup>, Munda, and O'Neill 1998)*

The quote is the title of a widely-cited article in the journal *Ecological Economics*.

In your Principles of Microeconomics class, if you teach one, you likely talk about, or allude to, people having a ranking of bundles based on betterment. And, as part of that discussion, you might talk about the marginal rate of substitution (MRS) between Coke and Pepsi, or Coke and chocolate. In my class, since I am an environmental economist, I might talk about the MRS between chocolate and the rate of global warming. You might think about your MRS, if you have one, between the rate of global warming and freedom to practice your religion. Let's start by making the assumptions that produce a complete ranking based in betterment.

I will start with what I mean by a *path*.

*A path for an individual is a conceivable life and world as it would unfold through time. It includes the goods and services they would consume through time (their consumption bundles), what they would know and not know at different points in time (their knowledge), what others would consume (other's consumption bundles), what others would know, plus the individual's relationships (social, sexual, work related), the relationships of others, and the environment (who is now and will be the future Prime Minister of England, air qualities, crime rates, etc.). Risks and uncertainties are part of every path.*

If you were taking an introductory microeconomics course, your path would be defined only in terms of the amounts of each market good you would consume, and it would be called your *consumption bundle*. But most of us care about much more. Every path generates a flow of feelings and thoughts, but, as I have defined it, a path is neither. You and I might be on the same path, but experience different feelings and thoughts. Each path includes risks, uncertainty, and ignorance, all of which pertain to global warming, the health effects of pollutants, and models of the environment.

Now assume:

*Assumption 1: At every point in time the individual can and must be on only one path*

*Assumption 2: At every point in time, the individual has a unique ranking/ordering of all conceivable paths—1<sup>st</sup>, 2<sup>nd</sup>, ..., 76<sup>th</sup> .... The individual has a ranking, if for all paths  $j$  and  $k$ , either*

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<sup>1</sup> [Joan Martinez-Alier](#) is a founder and past president of the [International Society for Ecological Economics](#),

*Path j is ranked higher than Path k, Path k is ranked higher than Path j, or Paths j and k have the same rank.*<sup>2</sup>

Assumption 2 simply says that if you present an individual with any two of all the conceivable paths, the individual knows (not necessarily consciously) which path is higher in his ranking.

Assumption 2 does not imply the ranking is based on betterment.

Finally, let's throw in betterment.

*Assumption 3: Taking a higher-ranked path is better for the individual, from their perspective, than experiencing a lower-ranked path.*<sup>3</sup>

The question considered is what is required of you in terms of comparability for you to have a complete ranking of paths based on betterment.<sup>4</sup> Note that while we often describe betterment in terms of tradeoffs, specifically in terms of MRS, having a complete ranking does not require that there are any paths between which you are indifferent—that is, a complete ranking does not require the existence of indifference curves. [An example demonstrates: consider two goods (more of each is better): chocolate and degree of religious freedom where paths with more religious freedom are always better, independent of the amount of chocolate in each path. No two paths are ranked the same and there is never a finite MRS between the two goods.] So, when discussing the ability to compare paths it will be important to distinguish between a ranking of paths in terms of betterment and MRS between components of paths.

I will mostly avoid the words *utility* and *preferences*: words fraught with multiple meanings and words that mean different things to different people. I will sometimes use the words *value* or *values*, but I worry about those words as well as I will explain below. Rather I will use the terms *better off* and *worse off*. An auxiliary term is *betterment*; as in, if all else you experience remains the same, a betterment makes you better off. The plural is *betterments*: there is more than one way to be better off. I chose *better off* because it is, hopefully, defined in a way

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<sup>2</sup> A complete ordinal ranking is, by definition, transitive. Transitivity implies that if *Path j* is ranked higher than *Path c* and *Path c* is ranked higher than *Path a* then *Path j* is ordered higher than *Path a*.

<sup>3</sup> Not all neoclassical choice theories assume a ranking based on betterment. Often the word *preference* is used as in higher ranked bundles are more preferred, where more preferred might, or might not, mean better. If this note made that assumption, it would discuss *bearer-of-preference comparability* and *preference commensurability*, which is what would be required for a complete ranking of paths in terms of preferences.

<sup>4</sup> There are many other reasons you might not have a complete ranking of paths, but those are not the topic of this note.

no one will object to: my specification is consistent with what is commonly meant by *better off*, and *better* is not commonly used in the economic choice literature, so has little baggage.<sup>5</sup>

For this note, imagine our concern is only one individual, for example, you, a human. Betterments (and worsements) are types of feelings, sensations, and thoughts. I will assume betterment is self-assessed and that there is no difference between your betterment and your self-assessed betterment.<sup>6</sup>

### Begin by considering the distinction between different *betterments* and *bearers-of-betterments*.

A bearer-of-betterment is a commodity, action, or situation that generates one or more types of betterment. Bearers of interest are all conceivable paths and their components. The question is whether you **can** have a complete and unique ranking of paths in terms of overall betterment. To be clear, the question is not whether you have a complete and unique ranking in terms of betterment, the question is what is required in terms of betterments and bearers-of-betterments for such a thing to even be possible.

You experience a path as a sequence/set of feelings, sensations, and thoughts. Experiencing certain sensations are types of betterment, so if two paths were to produce the same thoughts, the one that has more betterment sensations is better. For example, if two paths were identical except one has more of the sensation of taste sweet-‘n-salty, I would be better off with that one.

Alternatively, if two paths were to generate the same sensations and feelings but I think my life more satisfying with the second path (a thought), it is better. I have identified two types of betterment: enhanced life-satisfaction and the taste sensation sweet-‘n-salty. Caramels with sea salt and bacon bits are bearers of this sensation betterment, having children that prosper might be a bearer of life-satisfaction. Deaton and Kahneman (2010) refer to these two types of betterment as *emotional well-being* and *life-satisfaction well-being*.

If a philosopher was writing this, she might use *freedom*, *equality*, and *pleasure* as examples of betterments and the Bill of Rights as a bearer of freedom and equality. If she were

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<sup>5</sup> My use of *better* and *worse* is not without precedent. See Schroeder (2012).

<sup>6</sup> I ignore the important possibility that there are betterments the individual does not self-assess as a betterment and things the individual thinks will better them, but won't.

talking to other philosophers, she would likely use the words *values* and *bearers-of-value* rather than betterments and bearers-of-betterments, but, as noted, I am trying to avoid the *value* word.

There is no agreed list of betterments and worsements, and what might be a betterment for me might be a worsement for you. Betterments may include: sensual pleasure (tastes, sounds, sights), happiness, contentment, excitement, a sense of calm, relaxed, a meaningful/rich/full life, satisfaction (including life-satisfaction), other positive thoughts (including those about the future), learning, pride, loving, being loved, a sense of accomplishment, interactions with others, interactions with animals and nature, being free, being equal or being superior, justice being served. Worsements may include: different sorts of personal pain, anxiety, worry, depression, hunger, thirst, embarrassment, fear, sadness, anger, sickness, and disability, the experience of these by others, negative thoughts, loneliness, discriminated against, being inferior, and being controlled. What is on the list is not the critical issue, the critical issue is that there are different ways you can be better off and different ways you can be worse off.

Most people, including most economists and philosophers, are *betterment pluralists* (a philosopher would say *value pluralists*). [Cass Sunstein](#) (1994) makes a rousing case for betterment pluralism. The utilitarian Jeremy Bentham was not a betterment pluralist: he was a betterment monist; he assumed the only betterment is pleasure (a unidimensional pleasure/pain continuum), and a sensation that varies only in terms of magnitude and duration.<sup>7</sup> The philosopher and legal scholar Donald Regan is, I believe, a rare example of a modern monist. Quoting him (1997, 129):

*In this volume I am the 'designated eccentric', appointed to take a position no one else would touch with a barge pole, ... Specifically, I believe the following two propositions: (1) There is one and only one sort of value that matters to practical reason in the final analysis. This unique final value is G.E. Moore's 'good' ['good' as in approved of].<sup>8</sup> (2) Given any two items (objects, experiences, states of affairs, whatever) sufficiently well specified so that it is apposite to inquire into their (intrinsic) value in the Moorean sense, then either one is better than the other, or the two are precisely equal in value.*

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<sup>7</sup> Whether the utilitarian J.S. Mill was a betterment pluralist is a matter of debate. The philosopher Martha Nussbaum identifies him as one, him counting, for example, “music, virtue and health as major pleasures” (Nussbaum 2012, 338). In contrast, Mark Schroeder in his survey of Value Theory (2012) notes that “whether Mill properly counts as a pluralist about value depends on whether his view was that there is only one value — happiness — but two different kinds of pleasure which contribute to it, one more effectively than the other, or whether his view was that each kind of pleasure is a distinctive value.”

<sup>8</sup> As in the sentence, “It is good that you are here.”

## Incomparable and incommensurable:

Distinguish between comparing betterments (more freedom vs. more sexual pleasure) and comparing bearers-of-betterments (Is Path  $k$  overall better than Path  $h$ ? Are adding  $x$  more wild pandas to path  $h$  better, or worse, than adding  $y$  more teachers in your daughter's elementary school.) If two **types** of betterment are not comparable, philosophers use the word *incommensurable*. If two **bearers-of-betterments** are not comparable, they use the word *incomparable* (Chang 1997). The adjective betterment is implicit on both words—here we are concerned with comparing in terms of betterments.<sup>9</sup>

Bearers-of-betterments  $h$  and  $k$  are incomparable if **none** of the following statements are correct:  $h$  is overall better than  $k$ ,  $k$  is overall better than  $h$ , or  $h$  and  $k$  are equal in terms of betterment.<sup>10</sup> They are comparable if one, and only one, of these statements is correct. Obviously, paths  $h$  and  $k$  being comparable does not imply that either is comparable with any other paths.

Choice theory explicitly assumes all paths are comparable: if all paths are not comparable, there would not be a complete ranking of paths based on betterment.

Even if paths  $h$  and  $k$  are incomparable in terms of overall betterment, they still could be comparable in terms of a specific betterment (e.g. Path  $k$  generates more happiness than  $h$ , but less life satisfaction).

Commensurability: Betterments  $A$  and  $B$  are incommensurable if you are incapable of comparing one for another in terms of overall betterment (Wiggins 1997).<sup>1112</sup> For example, for you, personal freedom and equality are incommensurable if at some levels there is no answer to the question of much how social equality you would sacrifice, if any, to get one more unit of personal freedom. So, for example, commensurability requires that you can compare sensual pleasure music with the relief from finding out that Pandas won't be going extinct. Complete

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<sup>9</sup> Paths can be comparable on many different dimensions, for example, the total weight of the food you will consume in each path, or the number of pink swans that will bite you.

<sup>10</sup> This is viewed by some as a *weak* notion of incomparability. Chang (1997) suggests that in addition to better than, worse than, and equally good,  $A$  and  $B$  can be “on par”. *Strong* incomparability would be when none of the four conditions hold. “On par” or “roughly comparable” have been put forward as a possible solution to the problem of incomparability, but they violate transitivity of bearers (Hsieh (2007). For details see Parfit (1986), Griffin (1986, 1997, 2000), Chang 1997), and Hsieh (2007).

<sup>11</sup> One way to avoid the commensurability issue is to assume there is only one betterment, which is what Bentham did.

<sup>12</sup> Note that while betterment pluralism is necessary for there to be incommensurability, it is not sufficient—all betterments might be commensurable—which is what most economists implicitly assume.

commensurability means you have a complete ranking over all conceivable packages of betterments.

### Characterizations of incomparability and incommensurability in terms of quantities (MRS and Boome's characterization)

#### MRS

I will start with what comparability of bearers and commensurability of betterments means in terms of MRS because all economists are familiar with the concept. Boome's characterization, while possibly more insightful, is less well known. Specifically, what does comparability of bearers imply about MRS between bearers-of-betterments,  $MRS_{hk}$ ? And what does commensurability imply about the MRS between betterments,  $MRS_{AB}$ ? A sufficient, but not necessary condition for bearers  $h$  and  $k$  to be comparable is that  $MRS_{hk}$  is always a finite number. But this is not necessary as my earlier example of chocolate and religious freedom shows (more religious freedom was always preferred to less, independent of the amount of chocolate, so there is no amount of chocolate that would compensate for a loss of religious freedom, but the individual is comparing them, so they are comparable). In contrast, if I were to say, "I have no basis on which to compare chocolate with religious freedom," the two are incomparable.

A sufficient condition for two betterments to be commensurable is that the MRS between them is always a finite number. But, again this is not necessary. For example, if there is no amount of additional liberty that would substitute for the extinction of elephants, liberty and elephants are commensurable, but the MRS between them is not a finite number.

#### [John Boome's \(2001\) characterization](#)

Boome is an economist and philosopher at the University of Oxford. *Ceteris paribus*, consider whether it would be better to have 100 more prospering herds of elephants or a 7% reduction in the rate of global warming. Assume elephant herds are a good (more is strictly preferred to less) and the rate of global warming is a bad. Denote the initial state  $(e^0, g^0)$ . Let  $e^1$  denote the world with the 100 more prospering elephant herds, and take the switch from  $e^0$  to  $e^1$  as given. Consider Figure 1, and start by noting that  $(e^1, g^0)$  is better than  $(e^0, g^0)$ —more elephants and the same rate of global warming.

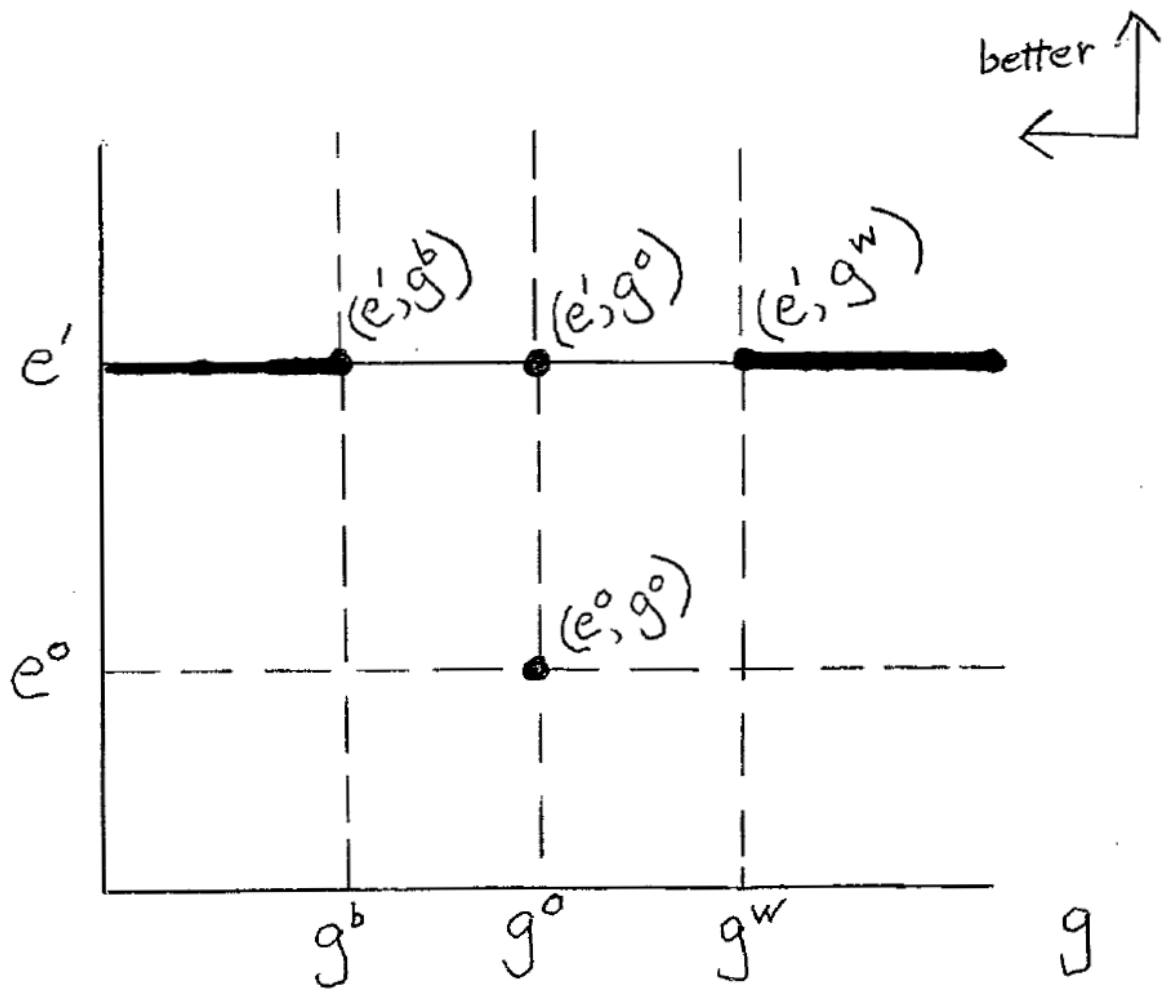


Figure 1: Characterizing comparability and incomparability in terms of bundles

Now imagine all those amounts of  $g$  such that  $(e^1, g)$  is strictly worse than  $(e^1, g^0)$ . Denote the boundary of those bundles  $(e^1, g^w)$ . So, in my example, all the bundles on the  $e^1$  line at and to the right of  $(e^1, g^w)$  are worse than  $(e^1, g^0)$ . Now imagine all those amounts of  $g$  such that  $(e^1, g)$  is strictly better than  $(e^1, g^0)$ . Denote the boundary of those bundles  $(e^1, g^b)$ . So, in my example, all the bundles on the  $e^1$  line at and to the left of  $(e^1, g^b)$  are better than  $(e^1, g^0)$ .

Critically note that I have imagined  $g^w$  and  $g^b$  such that there are amounts of  $g$  on the  $e^1$  line between  $(e^1, g^b)$  and  $(e^1, g^w)$  that are neither strictly better nor strictly worse than  $(e^1, g^0)$ . Is this possible? It depends. Back up and assume for the moment, inconsistent with Figure 1, that there is only one level of  $g$  between  $(e^1, g^b)$  and  $(e^1, g^w)$ , and denote it  $g^i$ . If there is only one



point, it must be the case the individual is indifferent between  $(e^0, g^0)$  and  $(e^1, g^i)$ .<sup>13</sup> So, if there is only one amount of  $g$  between  $(e^1, g^b)$  and  $(e^1, g^w)$ , all amounts of  $g$  are comparable to the change in  $e$  (there is comparability).

Now return to the example as represented by Figure 1, an example where there are multiple amounts of  $g$  between  $(e^1, g^b)$  and  $(e^1, g^w)$ . And further imagine that there is at least one  $g$  in this range,  $g^i$ , that results in indifference. But now there is a contradiction: since less  $g$  is strictly better, bundles between  $g^i$  and  $g^w$  must all be strictly worse than  $(e^1, g^0)$  and all bundles between  $g^i$  and  $g^b$  must all be strictly better, forcing the gap to collapse to a single bundle. That is, if there is an amount of  $g$ ,  $g^i$ , that causes indifference between  $(e^0, g^0)$  and  $(e^1, g^i)$  it must be unique.

So, if there is more than one bundle on the  $e^1$  line between  $g^b$  and  $g^w$ , these bundles are not strictly better than  $(e^1, g^0)$ , nor strictly worse than  $(e^1, g^0)$ , nor equal to  $(e^1, g^0)$  in terms of betterment. That is, the bundles in the gap are not comparable (cannot be ordered in terms of betterment) to  $(e^1, g^0)$ .<sup>14</sup>

Boome's characterization of bearer-of-betterment incomparability emphasizes the ordering requirement and drives home the point that incomparability does not mean you can never compare, only that comparability is not possible at some levels. For example, all the bundles on the two shaded segments are comparable to  $(e^0, g^0)$ . Taking another example, while I am not sure I could compare all possible income reductions with all possible reductions in the rate of global warming, I am able to compare ten dollars less of income with a 10% reduction in the rate of global warming. All that is needed for incomparability is that there are some income reductions where I would not be able to rank the status quo vs. a 10% reduction combined with any of those income reductions.

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<sup>13</sup> Or, at least, Boome thinks its indifference is obvious, arguing that if an infinitesimal increase (decrease) in global warming makes you worse off (better off), you must be indifferent between  $(e^1, g^i)$  and  $(e^0, g^0)$ .

<sup>14</sup> Demonstrating incomparability is a bit more difficult to graphically show if one drops the assumption that more (or less) of each bearer is strictly better. For example, the individual could be indifferent between every bundle in the gap, and this would be an additional example of comparability.

A complete ranking of paths based on overall betterment requires complete path comparability which, in turn, requires complete betterment-commensurability<sup>15</sup><sup>16</sup>

That is, lack of complete betterment-commensurability is sufficient to guarantee that there cannot be a complete ranking of paths based on overall betterment.<sup>17</sup> So sweet-‘n-salty must be commensurable with life-satisfaction, along with all other types of betterments.

A problem for choice theory and welfare economics is that many people, including many (but not all) philosophers, reject complete betterment-commensurability. These doubters believe there are incommensurables (betterments that cannot be compared at all levels), and if they are correct there can be no answer to the question of what is your highest-ranked feasible path.<sup>18</sup><sup>19</sup> In which case, overall betterment and economic value are not well-defined concepts.<sup>20</sup> But as the Harvard ethics scholar Nien-hê Hsieh (2016) notes, betterment incommensurability is not only a problem for choice theorists and welfare economists.<sup>21</sup>

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<sup>15</sup> I proceed, taking as given, that if there is complete comparability of paths based on betterment, there must be complete betterment commensurability, but, in objection, some philosophers argue that there can be complete path comparability without complete betterment commensurability. Hsieh (2016; sec. 3) provides a list of their arguments, arguments that I do not find convincing. One argument is based on “strong comparability” of paths, an assumption I do not make. See Footnote 10.

<sup>16</sup> A more difficult question is whether complete betterment-commensurability is sufficient for complete path comparability. It seems to be, but the answer is not important for our discussion.

<sup>17</sup> There can be partial rankings. For example, if all the different tastes, feelings, and thoughts produced by eating chocolate of different types and quantities are commensurable, there will a ranking over paths that vary only in terms of types and quantities of chocolate eaten. There can also be a partial ranking in the sense that while Path *j* is ranked higher than Path *c*, there are paths between them that have more betterment than *c* and less than *j* but can themselves no be ranked in terms of betterment (compared to each other they are not better than, worse than, or equal in terms of betterments).

<sup>18</sup> They don’t reject the idea that some experiences are commensurable (the pleasure of Coke vs. Pepsi), just that some aspects of betterment cannot be compared. For example, feelings produced by environmental injuries and animal extinctions might not be comparable to those produced by drinking a Coke.

<sup>19</sup> A distinction beyond the scope of this paper is whether one assumes individual chooses his highest-ranked feasible path (optimization) and whether the individual chooses a feasible path that is no worse in terms of betterment than any other feasible path (maximization). The standard choice-theory-theory assumption is that the individual optimizes. Sen (1997) and Hsieh (2007 and 2016) discuss this distinction.

<sup>20</sup> The statement, “Path *k* is overall better than Path *h*,” is equivalent to “Path *k* is more valuable (embeds more value).”

<sup>21</sup> Hsieh (2007) suggests a possible solution to the rational choice problem when there are incomparable bearers-of-betterments. One could replace the choice-theory assumption that the individual chooses their highest-ranked feasible path with the assumption that the individual chooses a feasible path that is no worse (in terms of betterment) than any other feasible path. See also Footnote 18.

*The possibility of value incommensurability is thought to raise deep questions about practical reason and rational choice as well as related questions concerning topics as diverse as akrasia, moral dilemmas, the plausibility of utilitarianism, and the foundations of liberalism*

Commensurability is also critical to tort law (e.g. can you be compensated with money for the loss of an arm, a cognitive ability, or loved one?).<sup>22</sup> Commensurability is also critical to assessing whether a system or economy is sustainable.

As economists, we can of course reject the arguments against complete commensurability, but we still should be aware of them and be able to articulate why we reject them. And, we should be aware of evidence in favor of betterment commensurability. A possible distinction between *environmental economists* and *ecological economists* is that the latter are more likely to reject the assumption of complete betterment-commensurability.

Commensurability requires that the feelings, sensations, and thoughts generated by an act or situation can be separated from that act or situation.

For example, the pleasure you get from eating chocolate must be separable from the eating, and the pride you have in your children must be separable from what they did to make you feel proud. If such separability was not the case, betterments could not be aggregated independent of the bearers of those betterments. This condition is referred to as *betterment/bearer separability*—think of it as a type of consequentialism (only the consequences of the action matter, not what bore those consequences).

Note that complete betterment/bearer separability is necessary, but not sufficient, for commensurability—an example demonstrates: the separation of happiness from the bearers of happiness and the separation of life-satisfaction from its bearers does not imply that happiness and life-satisfaction are commensurable.

The rejection of betterment/bearer separability goes back to Aristotle.<sup>23</sup> The philosopher Martha Nussbaum (2012) explains:

*Throughout his [Aristotle's] work, he insists on the tremendous importance of qualitative distinctions among the diverse constituent parts of human life; he later suggests that these distinctions affect the proper analysis of the concept of pleasure.... pleasure is something that*

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<sup>22</sup> See, for example, the *University of Pennsylvania Law Review* symposium on commensurability (Adler 1998), and Sunstein (1994).

<sup>23</sup> Martinez-Alier, Munda, and O'Neill (1998) provide a review of past economic debates on incommensurability, including the debates on the 1920s and 30s (Heurath, Hayek, Weber, Von Mises) on the functionality of socialism (the ability to compare values in the absence of prices generated by markets).

*comes along with, supervenes on, activity, “like the bloom on the cheek of a young person.” In other words, it is so closely linked to the relevant activities that it cannot be pursued on its own, any more than bloom can be adequately cultivated by cosmetics. To get that bloom, you have to pursue health. Similarly, one gets the pleasure associated with an activity by doing that activity in a certain way, apparently a way that is not impeded or is complete. It would seem that what Aristotle has in mind is that pleasure is a kind of awareness of one’s own activity, varying in quality with the activity to which it is so closely linked. In any case, pleasure is not a single thing, varying only in intensity and duration... It contains qualitative differences, related to the differences of the activities to which it attaches.*

Nussbaum goes on to argue that J.S. Mill also rejected betterment/bearer separately. She then goes on to say that “Modern philosophical discussion of pleasure follows Aristotle and Mill” (2012, p 338). That is, she believes many modern philosophers reject betterment/bearer separability.

While this note is about humans, I imagine that the extent to which betterments can be separated from their bearers varies greatly across species: becoming more difficult the greater the species’ ability to cogitate. Humans experience feeling and sensations, consciously process those sensations in terms of their past experiences, their knowledge, and the big picture. This cogitating then produces additional feeling and sensations to cogitate about. And while all this is going on, new actions and circumstances are producing new feeling and sensations. Contrast this with animals who experience positive and negative sensations but do not have the cognitive capacity to assess and evaluate them. In terms of dogs and worms, my conjecture, maybe wrong, is that it is likely easier for my dog than for me to separate a pleasure from the activity that produced it, and easier for a worm than for my dog.

Related to the above conjecture is the conjecture that there are fewer dog betterments than human betterments, and fewer worm betterments than dog betterments. Consider, as an example, your ability to separate a simple sensation such as pain from the activity or circumstance that produced it. The same chest pain could be because you just ran your best marathon, because you are getting divorced, because you are having a heart attack, or because you just reached the top of Mt. Everest. Whether the pain is a betterment or worsement, and of what sort, depends on whether you chose it, whether you think it will be gone in the morning, what you imagine is causing it, and whether experiencing it helped you achieve an important goal. Since humans think about the causes of their sensations, this suggests difficulty in separating the feeling from what caused it. Most other animals can’t cogitate about their sensations.

In thinking about bearer/betterment separability in terms of the environment, first distinguish between environment-specific betterments and bearers of those betterments. More wilderness, less global warming, and moving a species off the endangered species list are examples of bearers of environmental betterments, not betterments. The first question about environmental betterments is are there such things? That is, are there betterments that only the natural environment can provide? This is not a question I am going to fully answer, but many people believe there are environment-specific betterments. Examples include the special freedom that only being in the wilderness can provide, environmental self-reliance, experiencing animals and plants in their natural state, experiencing the unity of the natural world, including our place in it, and the wonder and awe evoked by sights such as lightening at night illuminating ragged mountain peaks.<sup>2425</sup>

The issue is whether everyone can separate these betterments can be separated from their bearers. Sunstein (1994) says NO. For example, he discusses how the *awe* produced by viewing a mountain produces awe is different from the awe produced by viewing a skyscraper, which is different from the awe produced by a remarkable musical or athletic performance, and since these awes cannot, in his view, be separated from their bearers, they are incommensurable. And, in addition, they are incommensurable with the betterments produced by consumption of conventional goods and services.

Many environmental bearers generate betterments and worsements that are public in nature in that everyone experiences the existence of the bearer (if the rate of global warming is reduced for you it is reduced for everyone, same for saving a species from extinction). This raises the issue of whether it is more (or possibly less) difficult for you to separate a public betterment from its bearer than separating a bearer you only experience (e.g. eating a ice cream cone) from the betterments produced. I don't have a good answer. A related issue is whether one has the right to compare public and private bearers. This is discussed later in the paper.

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<sup>24</sup> In contrast, there are betterments that are often experienced in natural settings such as thrill of going fast on skis, a bike, or a snowmobile that are, arguably, not environmental-specific betterments.

<sup>25</sup> It is important to contrast an environmental betterment—something that makes a human better off in way that can only be generated by environmental resources—and other reasons for preserving environmental resources such as inherent value (environmental resources are valuable for their own sake, independent of their effect on humans), they have a right to exist, independent of mankind, and humans have a responsibility towards other species given our position in the pecking order.

I have sympathy for betterment/bearer inseparability, but suspect it depends a lot on the specific bearer and the specific betterment, and the extent to which the betterment has a significant cognitive component.

### Other arguments against complete commensurability include:

You cannot compare certain betterments because it would be unacceptable (morally) to even imagine such tradeoffs—it is culturally or religiously wrong.

Consider, for example, the question of how much money you would have to be paid to push the button that would forever eliminate elephants from the earth, or the button that would open the pipe and dump a million tons of PCBs in Lake Michigan, or the button that would eliminate equal rights. Many normal people—but not economists—would find it off-putting and wrong to even consider such tradeoffs. That is, if it is wrong to make certain comparisons, they are not made.

Inability to compare because of moral or cultural sanction is likely to vary drastically by culture and religion. Research suggests that high socioeconomic-status secular Westerners (Europeans and North Americans) are more likely make certain comparisons than are non-Westerners and Western religious conservatives (see, for example, Haidt and Graham (2007) and Graham, Haidt and Nosek (2009)). For example, the two latter groups, but not the first group, morally require in-group/loyalty, authority/respect, and purity/sanctity, making it difficult for them to compare violations of these sanctions with money. While I do not know of a specific study demonstrating this, I conjecture that for many North-American tribes the betterments born by their culture and natural surrounding would be incommensurable, on moral grounds, with betterments resulting from market goods and services. This is problematic because tribes are often trustees in NRDA cases.<sup>26</sup>

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<sup>26</sup> To cite an extreme example, consider the “water pollution, soil contamination, deforestation, and cultural upheaval” (Wikipedia: Lago Agrio oil field) resulting from oil exploration and extraction in the Sucumbios Province of Ecuador caused by Texaco (now owned by Chevron) and its effect on the indigenous tribes who, arguably, lost a big part of their culture and way of life. Chevron and Ecuador battled over damages in both the U.S. and Ecuadorian courts. [https://en.wikipedia.org/wiki/Lago\\_Agrio\\_oil\\_field](https://en.wikipedia.org/wiki/Lago_Agrio_oil_field)

Another reason why you might not have complete betterment-commensurability is if you have no ability to control how much of a betterment you experience (its level is fixed from your perspective), so you do not compare it with other betterments.

Put simply, you do not sweat what you cannot influence. Elizabeth Anderson (1997) articulates this argument more generally by saying that it is there is often no good reason for thinking about how you would trade off one betterment for another, and besides it being a waste of your time, it would, for many, be something to avoid. Economists, in contrast, assume you have a complete ranking over all conceivable paths so reject the idea that MRS are created as needed. Economists, like me, who value in dollars environmental resources assume you have a well-defined MRS between money and the betterment from less global warming (e.g. your WTP for the betterment from less global warming) even before you see your first global warming CVM survey. Economists of my ilk would say that a CVM survey is simply a way for the surveyor to find out your WTP to reduce global warming (less global warming is the bearer). In contrast, I suspect Anderson would say that you don't show up at the survey center with a WTP for Panda-preservation betterment because it never crossed your mind that you could buy Panda-preservation betterment. And, you would not create it during the survey unless you were convinced by the survey that it was for sale. Those of us in the actual business of creating and using CVM surveys to value environmental resources have sympathy for her point, but not enough to reject the commensurability of money-betterments and less global-warming betterment.

Most of us have no ability to control pollution levels or amounts of environmental preservation, so don't compare them with bearers of betterments whose levels we can influence.

Two betterments might be incommensurable if comparing them is incompatible with experiencing one or both of those betterments

The argument is that there are some betterments that are inconsistent with you being willing to give them up for money or goods. An example is companionship (Raz 1986). Raz argues—in my words not his—that you cannot have a MRS between companionship and money, because being in a meaningful relationship with someone requires that neither you nor your partner has a MRS between your relationship and money. Of course, some people do have a MRS between companionship and money, but they are then not in a meaningful relationship, or so the argument goes. Another example, consider the Grace-of-God. God is unlikely to shed his

graces on you if you have a MRS between the Grace-of-God and money—at least I wouldn't if I were God.<sup>27</sup>

I find this argument compelling for religious betterments and personal-relationship betterments (romantic love, companionship, friendship, love of family, etc.) If the argument is correct, for you, you have incommensurables in that you would not be able to rank all bundles that varied in terms of religious, personal, and environmental betterments.

But that does not mean there are environmental betterments that necessarily have the property that experiencing them is incompatible with being willing to give them up for money or goods. Environmental betterments, unlike companionship, do not necessarily require another human, and the natural environment, unlike a partner, does not care how you think about it, so one cannot argue that nature will toss you in anger just because you would be willing to trash it for a big enough pile of money. The argument needs to be that there is something **within you** that makes it impossible for you to experience a betterment if you are willing to sacrifice it for money or goods. If that something within you is that it would be morally wrong to sacrifice it for money, it is the above argument, not this argument. So, if this argument is to apply it would have to be something else that makes experiencing an environmental betterment incompatible with being willing to sacrifice it for money. I am unclear on what that might be, but it might be a belief that nature is special in that our relationship to it is fundamentally different from our relationship with produced goods and services, and that a willing to sacrifice our relationship with nature for goods and services would be a rejection of its specialness. Consider the phrase, “love of nature”. If you truly love nature, as you love your partner or child, a willingness to destroy it for money would be inconsistent with loving it.

A possible example is animal pain: Much of nature is alive, and many living things can experience pain and suffering. In addition, humans can influence the amount of suffering non-human animals experience. Plus, non-human animals are rarely motivated by a need or desire to

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<sup>27</sup> Sunstein (1994) provides an amusing example: “Suppose that [Adam] Smith has arranged to have lunch with a friend today, but that he has become very busy and perhaps would like to cancel. Suppose Smith thinks in this way: if he cancels, his friend will be disappointed, because he would like Smith’s company, and also a bit insulted, because it is cavalier and disrespectful to cancel lunch at the last minute. Maybe Smith should make it up to him, or provide compensation, by offering a nontrivial cash payment...[but] A cash payment would be inconsistent with *the way* that someone values a friend. Even if the friend would prefer \$1, or \$10, or \$100, or \$100 to lunch with Smith—the offer of cash would be perceived as an insult rather than a compensation. In this context, the difference in kinds of valuation [betterments] means that a financial exchange would be inappropriate.”



make humans suffer, so are not morally responsible for any pain they cause us. That is, our relationship with animals is fundamentally different from our relationship with goods and services that are not animal based.<sup>28</sup> This, arguably, makes it either problematic or wrong to compare the pain chickens suffer with the pleasure of attending more raves.<sup>29</sup> A similar incommensurability argument could be made that the betterment (or worsenment) you would get from lessening the pain of other humans is incommensurable with your pleasure from attending raves.

### Inadequate processing skills

Imagine I have full information about two paths or bundles in the sense of what each entail, so my ignorance is not an issue. However, the paths have more moving parts than I can cognitively process, making it impossible for me to rank them in terms of betterment. I mention this possible cause of incommensurability, but don't want to make too much of it because this inability causes more than just incommensurability issues for choice theory. You might want to counter that this is an example of inability to compare because of ignorance and not a real example in incommensurability of betterments. It is ignorance in the sense that I am ignorant of the betterment effects of each path, but I am not ignorant of the properties of each path, so it isn't ignorance of the world in the conventional sense of knowledge.

### Saying A and B are incommensurable (or commensurable) does not make it true.

As pointed out by Judge [Richard Posner](#) (1998), an incorrect argument for the existence of incommensurables is that people often assert that they can't compare some betterments. The problem with the argument is that we often have an incentive to say we can't make the comparison, when, in fact we could. We might not want to put in the cognitive effort; we might convey that we are a certain sort, even if we are not. Admitting to your partner that their love is comparable to the pleasure of sex outside of your partnership would likely reduce their love for you, so you lie. Saying you would accept much more global warming to save a few coal jobs, would not go over well with your environmental friends, but something you might say to your Trump friends.

And, because you think you can compare apples and oranges because you ate the orange rather than the apple does not mean you can compare apples with oranges in terms of betterment,

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<sup>28</sup> Of course, many of us think of chickens simply as commodities.

<sup>29</sup> Dancing all night to electronic dance music in a large dark space with many others—drugs are usually involved.

it does not even imply you “chose” the orange: you had to eat something (Morey 2017: Chapters 10-12).<sup>30</sup> Neoclassical choice theory assumes you can always choose from all feasible paths based on betterment, but that does not prove all betterments are commensurable, it is just another way of assuming all paths are comparable, which requires that all betterments are commensurable.

Incommensurability is sometimes mandated by law. E.g., U.S. Federal laws forbid the comparison of some environmental bearers-of-betterments. Consider, *The Endangered Species Act*. Saving a particular species is, for most of us, an environmental betterment, but so would be saving a different species. Commensurability of these betterments would imply that it might sometimes be best to extinct one species to save two from extinction, but the Act, with few exceptions, forbids this: implying saving one species is incommensurable with saving another. “To the same, the Delaney Clause forbids an entry of carcinogenic substances onto the market, banning tradeoffs of any sort” (Sunstein 1994, p.835). And, the U.S. Federal Courts have ruled that even if dollar damages from the degrading of an environmental resource is less than the cost of restoring the resource, the destroyer is responsible for the higher restoration costs, implying betterments obtained by spending the dollar damages on other things is not commensurable with the betterments produced by the resource in its initial state (the Courts interpretation of the view of Congress).

[Can you compare in terms of betterment your level of knowledge about an environmental process with the level and extent of that process?](#)

Consider next acquisition of knowledge and information, particularly knowledge about the environment and natural world. If you are living without full information, one way to make yourself better off, or worse off, is to allocate time and money to education. For example, consider learning about global warming (the process and its effects). I chose global warming as an example because it is a global public process and is, arguably, a process that could make

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<sup>30</sup> The flip side of Posner’s point: a common, but illogical, argument made for both complete comparability and complete commensurability is that people make choices, and given that most people are betterment pluralists they must be making tradeoffs between all the betterments associated with each alternative (having and calculating all the MRS’s). This argument is circular. Make a distinction between behavior, a choice, and the correct choice. Economists make two assumptions: most behaviors are chosen (you drank Coke rather than Pepsi because you chose Coke over Pepsi), and it was the best choice (Coke was the best alternative given your options). If you start by assuming that people make choices and those choice are based on overall betterment, then betterment commensurability is assumed. See Morey (2017) for a review of the psychological and neurological research on these assumptions.

many people a lot worse off. I also chose it because many people are ignorant about the process of global warming and its effects, and seem to want to stay that way.

Education leads to knowledge and knowledge is arguably, a type of betterment (of course more might be better for you, while less might be better for me). Education (reading, studying, and listening) is the bearer. The question at hand is whether knowledge is commensurable with other types of betterments. Knowledge, once acquired and short of dementia, can't be traded away. You can sell your house and car, but you can't unlearn things, even if what you learned made your worse off.<sup>31</sup> Another aspect of knowledge is that before you acquire it you are ignorant, so cannot have a good prior as whether its acquisition will make you better or worse off. These two aspects of knowledge suggest that it might be difficult to compare knowledge with other bearers of betterments.

Return to Figure 1 and now let  $e$  be my education level with respect to global warming. A bundle now consists of a certain level of education about global warming and a certain rate of global warming. Can I compare these two bearers-of-betterments? I am not sure; there are inherent difficulties. To keep things simple, assume that everyone agrees that a lower rate of global warming is better, but because I am uneducated on the topic I don't know how much better off a lower rate will make me. Further imagine that my uneducated prior is while global warming is a bad, it is not much of a bad.<sup>32</sup> Given all this, how would I determine whether I would be better off in a world where I am more educated about global warming and there being some different rate of global warming? I don't know that I could make such comparisons. Now flip the example, and imagine I am already educated about global warming (so know how it works and its effects). Then I am asked to decide whether I would be better off if I was more ignorant and there was some different rate of global warming. How do I assess not knowing what I already know?

In summary, many people are ignorant about physics, chemistry, and biology, in particular in terms of the environmental sciences, ecosystem dynamics, and the health effects of chemicals in the environment. And, the betterments, or worsements, we experience when our environment changes (species go extinct, the rate of global warming changes, there is less (or

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<sup>31</sup> In a recent study, [Ananda Gaguly](#) and [Joshua Tasoff](#) (2016) found that 16% of the university students sampled were willing to forego a payment of \$10 to avoid learning whether they had genital herpes. [David Eli](#) and [Justin Rao](#) (2011) have found that people will pay to not learn about their IQ or how attractive others find them.

<sup>32</sup> Also think through the example imagining in my ignorance I imagine it is way worse than it actually is.

more) lead) are a function of our personal level of knowledge—ignorance is often bliss. But once knowledge is acquired it is not freely disposable. All suggesting that comparing environmental betterments with knowledge about the environment is difficult, causing me to imagine I am incapable of ranking some paths in terms of their environmental effects and my knowledge about those effects.<sup>33</sup>

A few additional qualms about the commensurability of environmental betterments:

The fact that many environmental amenities are public commodities (non-congestible and nonexcludable) makes some people incapable of comparing the personal betterment they would get from different amounts of private goods with the betterment everyone would get from cleaner air or less global warming—they feel they do not have the **right** to make such comparisons, so won't. Of course, this argument would apply to all public goods and bads. Whether this hypothesis is correct, and to what extent, is an empirical question that could be experimentally studied.<sup>34</sup>

Imagine comparing betterment relief from less global warming and the betterment resulting from being less anxious. Making such comparisons is complicated by the fact that being more anxious will influence how much relief you get from a given change in the rate of global warming. One could test this in the lab by invoking anxiety before the start of a CVM survey or choice experiment. The design would vary the amounts of both the hypothetical changes in the rates of global warming and the amounts of anxiety invoked in the subjects.<sup>35</sup>

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<sup>33</sup> Consider some other similar types of tradeoffs: a medical test that will inform you as to whether the black mole on your toe is a deadly cancer vs. what treatments exist for the cancer; educating yourself on the research on the benefits and costs of immunizing your children vs. immunization rates; and knowing the actual probability that you will be killed in a terrorist attack vs. how much is spent on fighting terrorism.

<sup>34</sup> My prior is that stated WTA to accept the deterioration of an environmental amenity is biased as an increasing function of the publicness of its betterments, and the direction of the bias depends on whether the amenity is increasing or decreasing. This is because people do not want to compare benefits that accrue only to them with worsements that accrue to everyone else.

<sup>35</sup> Anxiety levels can be manipulated with, for example, computer simulations and by varying the environment. Listening to this 911 call will make you anxious (<http://clipp.instruct.de/player/data/db/video/106672.mov>) Be warned; it is disturbing. Raghunathan and Pham (1999) is an example of a study that evoked anxiety.

One would also want to collect data on the subjects that might explain variations across individuals. Such data could be as simple as age or gender, but could include answers to psychological-profile questions. For examples of how personality influences the answers to environmental choice questions, see Solinō and Farizo (2014), and Morey and Thiene (2107).

Personal responsibilities and personal commitments can also complicate commensurability. [Contrast personal responsibilities and commitments with those placed on everyone by religious or cultural mores.] Consider, for example, a western rancher whose ranch has been in the family for generations. Typically, such ranches provide wild-life habitat which is a bearer of environmental betterment for many ranchers.<sup>36</sup> In addition, many of these ranchers are committed to, and feel responsible for, both maintaining the ranch in its current state and keeping it in the family (together the motivation for conservation easements). It would not be surprising that some of these ranchers would have difficulty comparing the betterment associated with maintaining the ranch habitat with the betterment obtained by retiring to a condo in Florida.

One final complaint about a world of complete commensurability and complete comparability: most the richness and variety of life would be beside the point. No one would care, at the end of the day, what caused their betterments and worsements (another way to define commensurability).<sup>37</sup> Many people would hope they do not live in such a world; but this, of course, does not prove they don't.

### Some neurological research on betterment commensurability?

Contrasting with the above philosophical arguments that some betterments are not commensurable are recent research findings on the neurobiology of choice which suggest based on a meta-analysis of MRI data (Levy and Glimcher 2012) that

*Neuroimaging studies in humans have recently begun to suggest the existence of a small group of specific brain sites [the striatum and portions of the ventromedial prefrontal cortex] that appear to encode the subjective values of different types of rewards on a neural common scale, almost exactly as predicted by theory [economic choice theory].*

Quoting Levy and Glimcher (2012), “But what happens in the brain when we need to choose between a large amount of water and a single apple? Or a small amount of water and two apples?” The brain needs to assess both “reward type” and the quantities of each type.

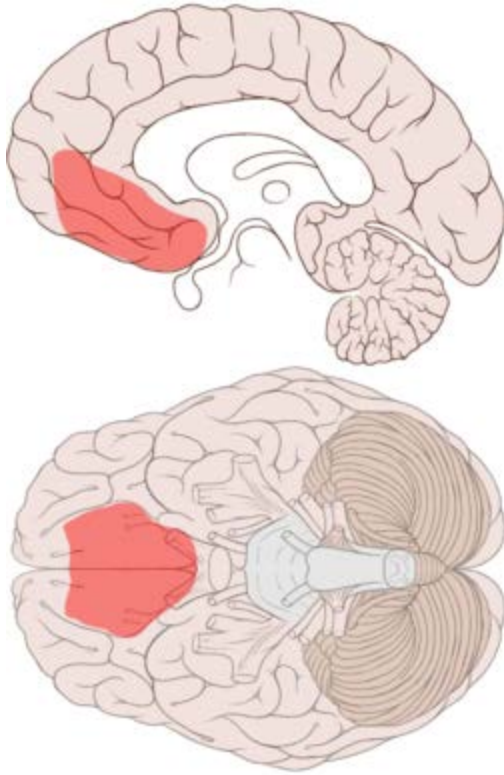
*Indeed, there is now broad consensus in the neuroscience of the decision-making community that reward magnitude is represented in a small number of well-identified areas. Here we conduct a meta-analysis using evidence from human functional magnetic resonance imaging (fMRI) studies conducted over just the past few years that suggest that one of these reward*

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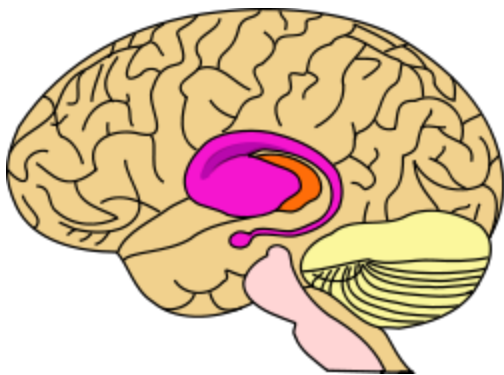
<sup>36</sup> Ranches where I live north of Steamboat CO, in addition to grazing cattle and sheep, provide habitat for elk, deer, moose, mountain lions, trout and many other animals. There are conservation easements on many of these properties.

<sup>37</sup> Consider how hedonic price and wage studies critically depend on betterment commensurability: in equilibrium living in Pittsburg is equal to living in Aspen in terms of overall betterment

*magnitude encoding areas, the ventromedial prefrontal cortex/orbital frontal cortex (vmPFC/OFC), can be thought of as representing the value of nearly all reward-types on a common scale that predicts behaviorally observed comparison and choice*



*Figure 2: Medial and ventral views of the Ventromedial Prefrontal Cortex: in top figure, left is front, bottom figure is looking up from below the brain, again with front at left.*



*Figure 3: The striatum*

Figure 3 shows your striatum (it is striated/striped). The striatum and the ventromedial prefrontal cortex together are your *valuation circuit* (Glimcher 2014).<sup>38</sup>

Imagine the valuation circuit as a two-dimensional topographical map of neurons, where each alternative in the current choice set (e.g. an apple and orange) is a different point on the map.<sup>39</sup> The value of an alternative is represented by the firing rate of the neurons at the point on the map that represents that alternative.

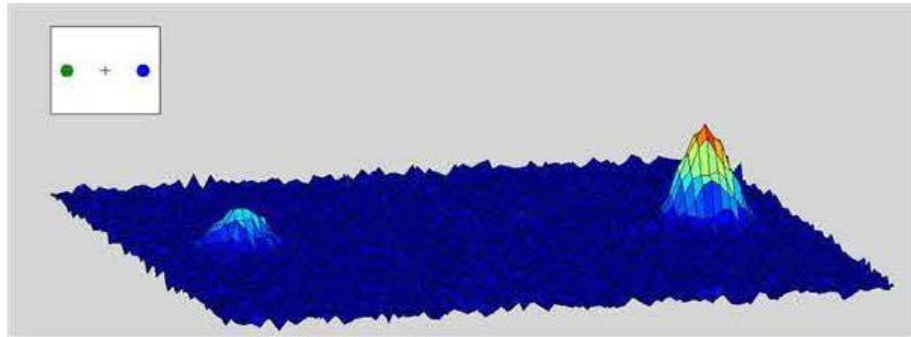


Figure 4: Cartoon of the valuation circuit with two alternatives (courtesy Ryan Webb)

Figure 4 is a cartoon showing the two peaks associated with a choice set with two alternatives, the higher peak indicating that the neurons at this position are firing faster than the neurons positioned at the lower peak. The alternative with the highest peak will be the alternative chosen. The process is somewhat stochastic, as in a random-utility model: there are random components to the fluctuations in neuron firing-rates, which causes the height of each peak to have a random component. While these random fluctuations are occurring, if the firing rate of a neuron increases, it tends to increase the firing rates of neurons in its vicinity while inhibiting the firing rates of more distant neurons, including those associated with the other peaks: the peaks are fighting it out: each peak is trying to make itself higher and the other peaks shorter. Eventually, one peak dominates and the alternative associated with that peak is chosen.

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<sup>38</sup> In contrast to the part of your brain called the *choice circuit*, the part of your brain that initiates you saying “Yes, I will pay \$5 to reduce global warming by 10%,” because paying \$5 is associated with a higher firing rate than saying “no”. See, for example, Glimcher (2014) for a discussion of the choice circuit and its relationship to the value circuit.

<sup>39</sup> “We know that most classes of information recorded in the cerebral cortex are topographically encoded on anatomically two-dimensional ‘maps’. The cortex is made of dozens of these small topographical maps” (Glimcher (2014)).

It is a map of the alternatives on the table. No one is suggesting that this region stores a complete ranking of all possible paths. Neuroscientists do not imagine there is such a place, so are not looking for it.



Getting ahead of the studies we discuss next, it seems that (1) the final selection of an alternative (at least for the sorts of sets of alternatives studied in neuroscience labs) always takes place in the valuation circuit, and (2) the variation in firing rates across the neurons in this area determines/predicts which alternative will be selected.

This suggests, at least for the alternatives studied, that, at the end of the day, each alternative is compared on a scale of one dimension (the firing rate of the neurons associated with each alternative), with the alternative associated with the highest firing rate winning. These findings are consistent with complete betterment-commensurability and complete bearer-of-benefits comparability.

In the studies reviewed by Levy and Glimcher (2012), subjects were presented with different alternatives or asked to choose between different alternatives while an fMRI machine scanned their brain to see what lit up and what did not light up (where energy was being expended). One can see which brain regions light up when the subject is presented with different amounts of the same reward, when presented with different reward types, and when presented with a choice where the alternatives differ by reward type and magnitude. The studies considered alternatives such as money (magnitude, and when it will be delivered), college trinkets (hats, etc.) pain, pictures of females that varied in attractiveness, and snack foods. It should be noted that in all of the studies that involved choosing, money was one those alternatives.<sup>40</sup>

Put simply, the reviewed studies show that no matter what options were presented, the valuation circuit was always activated. What is suggested and what is implied? These findings imply/suggest that what happens in this region of the brain always affects what the individual does (the alternative they indicate). But, this does not imply that the region converts everything onto the same betterment (value) scale, nor implies the individual identifies (chooses) the alternative with the most betterment. E.g., maybe this part of the brain determines you go with what you most desire at that moment, or which alternative makes you the least anxious.<sup>41</sup>

Said more weakly, the findings don't contradict the possibility that all aspects of the alternatives are placed on the same univariate betterment scale.

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<sup>40</sup> In some of the studies, the subject is presented with a set of alternatives, examines the alternatives and then chooses one. In other studies, the subject only examines the alternatives. In all the studies, the process is unfolding while the subject is in an fMRI machine which is recording in terms of energy expenditures the firing rates of neurons.

<sup>41</sup> For a discussion of desires/wants vs. likes, see Morey (2017, Chapter 4).



Further support for the conjecture that this area converts all the alternatives onto the same scale is that there is a correlation between how a subject says they would trade one alternative for the other, and the activation of different parts of this region (see, in particular, Smith et al. (2010) and Levy and Glimcher (2011)).

So, and summarizing, the neuro-imaging research surveyed by Levy and Glimcher suggests that individuals can convert, for the money and commodities studied, different sorts of betterments onto the same betterment scale. This suggests that humans are capable of betterment commensurability, at least to some extent. I don't think many of those who reject complete betterment-commensurability would be surprised by this finding, or disagree with it. Rather, I think they might say that betterment commensurability between money and snacks, or money and pain, does not imply complete betterment-commensurability.

If I had to question Levy and Glimcher's assessment of the data, as economists, they were looking for a spot in the brain where betterment commensurability takes place, and they found the likely candidate. [Is this misstating their perspective?] However, and repeating my earlier point, just because you did x rather than y does not imply that you chose to do x rather than y, and if you did choose to do x rather than y it does not mean you are better off doing x rather than y.

## Conclusions:

The foundation of economic choice theory is complete path-comparability in terms of overall betterment, which requires complete betterment-commensurability. The intent of this note isn't to claim that there is or isn't complete betterment-commensurability, but to review the issues, arguments, and present some relevant research.

While choice theory was originally about estimating the demand functions for market goods, its span has been creeping wider over time—which is why this note defines a ranking over paths rather than only bundles of market goods. Environmental economists, for one, have widened the scope of a bundle to include environmental, ecological, and nature-based recreational resources, many of which provide both use and non-benefits (or damages). Pushing back against the notion of putting economic values on the environment are environmentalists and

environmental ethicists who question whether and why environmental resources are comparable to goods and services in terms of the betterments they provide.<sup>42</sup>

If I had been working for British Petroleum on the legal case to assess the dollar damages from the 2010 oil spill in the Gulf of Mexico, and if my intent had been to reduce their liability, I would have introduced the argument that environmental betterments are often incommensurable with the sorts of betterments generated by spending on private goods, making it sometimes impossible for me, you, or anyone else to trade-off environmental injuries for money. Arguing this would, at a minimum, have forced the Trustees to hire some philosophers or neuroscientists to defend betterment commensurability (the philosophers probably could have used the extra income).

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<sup>42</sup> Recently, there is been an inclination/move by Federal U.S. government agencies to compensate for environmental injuries with in-kind replacement. For example, the responsible party compensates for their destruction of wetlands by being required to create or enhance comparable wetlands (e.g. replace ducks with ducks). This inclination is motivated, in part, be concerns about the commensurability of environmental betterments with the betterments produced by market goods and services.

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