

What We Choose, What We Prefer*

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1. Introduction

Rational choice theory models agents as having preferences over a feasible menu of options. Rational choice theory also models agents as choosing, from this feasible menu of options, those options which are most choice-worthy. But when rational choice theory models agents as having preferences over a feasible menu of options, *what* should we model these agents as having preferences *over*? And when rational choice theory models agents as choosing their most choice-worthy options, how should we model *what it is* that these agents *choose*?

These questions are important. On some ways of answering these questions, certain canonical axioms of rational choice theory become implausible as standards of rationality. On other ways of answering these questions, certain canonical axioms of rational choice theory become trivial in the sense that they cannot be violated. And finally, how we answer these questions determines the sorts of things we can use rational choice theory to do.

We thus face a difficult modeling problem. This paper addresses this difficult modeling problem by developing an account of what it is that rational agents choose and prefer in a way that (i) maintains canonical axioms of rational choice theory as intuitively plausible; (ii) avoids canonical axioms of rational choice theory from becoming trivial; and (iii) allows rational choice theory to be flexible, able to be put to several different philosophical projects. Before doing so, the paper examines other accounts of what it is that rational agents choose and prefer, showing why these accounts are inadequate.

2. Commodity Baskets

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When rational choice theory was first developed by economists to model market behavior it was assumed that rational agents have preferences over and choose between “commodity baskets,” “consumption bundles,” or “economic goods” (Hicks 1939; Samuelson 1947). While there might be some ambiguity as to what constitutes a commodity on the margins, the idea seems relatively straightforward. We have preferences over and choose between things like cars, phones, and books. At its most basic level, we have preferences over and choose between pure things, not things in a certain context or things under a certain description.

This account of what we choose and prefer runs into problems. To understand these problems we must first go over some formalism as well as some basic axioms of rational choice theory. Let R be a basic binary relation, and let the set $X = \{x, y, z, \dots\}$ represent choice options. Given the commodity baskets account, x might be a Porsche, z might be a BMW. R is defined to mean “at least as good as.” So if Althea thinks that Porsches are at least as good as BMW’s we represent this as xRz . From the R relation we build up the strict preference and the indifference relation. When Althea prefers Porsches to BMW’s (xPz) we represent this as xRz and $\sim zRx$. When Althea is indifferent between Porsches and BMW’s (xIz) we represent this as xRz and zRx . Many believe that rationality requires having a certain kind of preference ordering, one that is complete, transitive, and reflexive. A complete preference ordering means that, for all x and z , either xRz or zRx . A transitive preference ordering means that if xRz and zRy then xRy . A reflexive preference ordering means that, for all x , xRx .

Rationality requires going beyond having a certain kind of preference ordering, though. Rationality also requires acting on one’s preference ordering in a certain kind of way. In the terminology of rational choice theory, rationality requires choosing from the *choice set*, which is the set of *best elements* of a preference ordering. We define the choice set as follows:

$$x \in C(S) \leftrightarrow \forall y \in S, xRy$$

An option is in the choice set of S (where S is a subset on X) just in case that option is at least as good as every other option in S . Rationality requires choosing one such option. Assuming that people choose rationally, the fact that an agent chooses x when x , y , and z are available implies that the choice set for $\{x, y, z\}$ is x . We conclude xRy , xRz , and xRx .

Beyond choosing from the choice set, rational choice also requires agents make *consistent* choices. Two canonical consistency criteria are as follows:

$$\text{Property } \alpha: \forall x : [x \in S_1 \text{ and } S_1 \subseteq S_2] \rightarrow [x \in C(S_2) \rightarrow x \in C(S_1)]$$

$$\text{Property } \beta: \forall x \forall y : [x, y \in C(S_1) \text{ and } S_1 \subseteq S_2] \rightarrow [x \in C(S_2) \leftrightarrow y \in C(S_2)]$$

Property α is a basic contraction principle. It says that if x is in some set which is a subset on another set, then if x is in the choice set of the larger set it must also be in the choice set of the smaller set. As an example, Kenneth Arrow is an economist from the United States. The set of economists in the United States is a subset on the set of economists in world. If Arrow is chosen as the best economist in the world then rationality requires he must also be chosen as the best economist in the United States as well.

Property β is a basic expansion principle. It says that if two options are in the choice set of a smaller set, and if both options are members of some larger set, then either both must be in the choice set of the larger set or neither must be in the choice set of the larger set. As an example, if both John Rawls and Robert Nozick are chosen as the best philosophers in the United States, and since the set of philosophers in the United States is a subset on the set of philosophers in the world, then if Rawls is chosen as one of the best philosophers in the world then rationality requires Nozick also be chosen as one of the best philosophers in the world as well, and vice versa. While many think the α consistency property is more intuitively plausible than the β consistency property as a requirement of rationality, it is generally agreed that both are plausible requirements of rationality when viewed in the abstract. Not only are they plausible requirements of rationality, but the consistency properties are necessary and sufficient for choice functions to avoid problems of path dependency. So not only are the α and β consistency properties plausible requirements of rationality, they also serve important technical functions as well.¹

When we understand rational agents as having preferences over and choosing between commodity baskets we encounter violations of the α and β consistency properties that, intuitively, seem quite reasonable. This calls into question the intuition that the α and β consistency properties are plausible requirements of rationality. Consider an example, variations of which are given by

¹ These are just two very common consistency properties, and only two common ways of defining these two properties. For extensive overview of different consistency properties and different ways of formulating them, see Sen (1977/1982: §4).

Amartya Sen (Sen 1993/2004: 129; Sen 1997/2004: 167). Bertha is at a dinner party and offered a choice between two goods: either a mango or an apple. Call this set S_1 . Not wanting to be rude and choose the most delicious fruit for herself, Bertha chooses the apple. We can infer that the choice set for S_1 is an apple. Later on Bertha is faced with the choice between three goods: a mango, a mango, and an apple. Call this set S_2 . Clearly S_1 is a subset on S_2 . Because Bertha will not take the last mango when choosing from S_2 (there are two mangos now) she does not have to worry about offending other guests. As a result she chooses one of the mangos instead of the apple. The choice set for S_2 is thus a mango. But this violates α consistency. A mango is an element of S_1 , and S_1 is a subset on S_2 . Yet even though a mango is in the choice set for S_2 it is not in the choice set for S_1 . Call this case *Mangos*. *Mangos* questions whether the α consistency property really ought to be a requirement of rationality.

We can give similar cases of the β consistency property being violated that also seem reasonable. Suppose Cassidy is confronted with a pineapple and a papaya. Call this set S_1 . Equally attractive, Cassidy chooses both. The choice set for S_1 is thus both a pineapple and a papaya. Cassidy is then confronted with the same two options: a pineapple and a papaya. Call this set S_2 . When faced with set S_2 , though, Cassidy's friend happens to be present, who is a huge fan of papayas. Being gracious, Cassidy chooses only the pineapple, leaving the papaya for her friend. The choice set for S_2 thus only consists of a pineapple. But this violates β consistency. Both a pineapple and a papaya are in the choice set of S_1 , and S_1 is a subset on S_2 . The β property thus requires that if a pineapple is in the choice set of S_2 then so too must a papaya. But the choice set for S_2 is just a pineapple. Call this case *Papayas*. Like the violation of the α consistency property in *Mangos*, Cassidy's choice behavior in *Papayas* seems completely reasonable. Jointly, *Mangos* and *Papayas* cast doubt on whether the α and β consistency properties should be included as part of what it means to be rational.

Sen draws two conclusions from cases like *Mangos* and *Papayas*. First, he concludes that we cannot assess the rationality of behavior from checking for consistency of behavior alone. There must be some kind of *external reference* we appeal to when assessing rationality. By this Sen means that when appraising the rationality of choices we need to go beyond the x's, R's, and y's. We must go beyond how Althea orders x and y, and we must go beyond what it is that Althea chooses when confronted with x and y, when assessing the rationality of Althea's choice of x over y. In his words: "Indeed, being consistent or not consistent is not the kind of thing that can happen to choice functions *without* interpretation—without a presumption about the context that takes us beyond the

choices themselves” (Sen 1993/2004: 127). The first takeaway: we cannot determine rationality from internal consistency of the choice function alone. We must also look to external reference when assessing rationality.

The second point Sen draws from cases like *Mangos* and *Papayas* is that consistency properties like α and β may be applicable in some domains of choice. Writes Sen:

Avoiding the *a priori imposition* of ‘internal consistency’ requirement has to be distinguished from eschewing internal correspondences altogether—even if entailed by appropriate external correspondence. I have argued for the former, not the latter. Essentially, the argument is against the influential departure that took place with the advent of choice-theoretic axiomatics that relies on some *a priori* intuitive idea of ‘consistency,’ without relating the axioms to the underlying substantive exercise (Sen 1993/2004: 147-148).

The idea here is that in some domains of choice we ought to hold people accountable to α and β consistency. Notable here Sen says that “these axioms [the α and β properties] can often be very helpful in capturing the *shared* entailments of diverse objective functions relevant to consumer theory, thus permitting much economy of analysis” (Sen 1993/2004: 124). However, in other domains of choice the consistency properties might not be appropriate. Here Sen cites productive behavior, collective bargaining, political actions, some instances of consumer behavior, and choice under uncertainty: “In these cases the so-called ‘internal consistency’ conditions of the standard type may not be entailed by reasoned choices” (Sen 1993/2004: 125). Sen’s second takeaway: we should not totally give up on internal consistency conditions as requirements of rationality. We should just apply them carefully to certain kinds of actions and certain domains of choice.

In offering a new account of what we choose and prefer this paper disputes Sen’s two takeaways. First, this paper shows that we do not have to acquiesce in Sen’s second conclusion. An account of what we choose and prefer can be developed such that the α and β consistency properties can be applied to all domains of choice. Moreover, this paper greatly qualifies Sen’s first conclusion, which says that we must *always* rely on external reference in assessing the rationality of behavior. The account of what we choose and prefer developed in this paper allows us to assess the rationality of people’s choices from within certain shared perspectives. In this way rationality is contextualized. However, if diversity is too great and we do not have a shared perspective then we

cannot assess rationality from looking at internal consistency of the choice function alone. External reference is then required. More on this in section six.

3. Social Commodity Allocations

There is an obvious rejoinder to *Mangos* and *Papayas*. It is wrong to think that when Bertha faces S_1 and when she faces S_2 she faces similar enough menus of options to judge her behavior as inconsistent and thus irrational. When confronted with S_1 Bertha faces the choice of a mango plus being rude to other dinner guests (because there is one mango, everyone's favorite) and an apple, whose selection will not offend anyone. When confronted with S_2 Bertha faces the choice between a regular old mango whose selection will not bother anyone (because it is not the last one), another regular old mango whose selection will not bother anyone (because it is also not the last one), and an apple that no one cares about. Bertha's preference ordering and choice when confronted with S_1 is over *different options* than what her preference ordering and choice is over when confronted with S_2 . Since the two sets contain different choice options, the α consistency property is not applicable, for the relevant subset relation in the antecedent of the conditional does not obtain. The same sort of argument can be applied to Cassidy's choice behavior in *Papayas*.

When one understands rational agents preferring and choosing between commodity baskets such a response is off-limits. Though it might be a bit unclear, on the margins, what the exact conceptual limits of commodity baskets are, such a term does not include the fact that in choosing the last mango Bertha will upset other dinner guests. *That* is not a commodity. So in taking seriously this rejoinder we leave the traditional view of what we choose and prefer behind. Such a view cannot account for the rationality of the α and the β consistency properties.

The rejoinder that opened this section essentially enriches the information present in what it is we choose and prefer. When facing S_1 in *Mangos* Bertha is not only choosing a piece of fruit – she is also choosing how dinner guests will think of her. And in facing S_2 in *Papayas* Cassidy is not only choosing a piece of fruit – she is also choosing to respect her friend who loves papayas. But how do we enrich information in a non-arbitrary way? We cannot pack in any information we want whenever we observe choice behavior just to make the observed set of choices consistent. Such a

rescue of the α and β properties would be *ad hoc*.² We need some principled account of what it is we choose and prefer that enriches information to the point that there are no intuitively reasonable violations of the α and β consistency properties.

Arrow offered such an account in his important *Social Choice and Individual Values*. Breaking tradition with early twentieth century welfare economists in more ways than just one, Arrow understood rational agents as having preferences over and choosing between *social states*. Arrow defines social states like this:

The most precise definition of a social state would be a complete description of the amount of each type of commodity in the hands of each individual, the amount of labor to be supplied by each individual, the amount of each productive resource invested in each type of productive activity, and the amounts of various types of collective activity, such as municipal services, diplomacy and its continuation by other means, and the erection of statues to famous men. It is assumed that each individual in the community has a definite ordering of all conceivable social states, in terms of their desirability (Arrow 1951/2012: 17).

On Arrow's view, instead of modeling persons as choosing and preferring between pure commodities, we model persons as choosing and preferring between *distributions* of commodities, which can be represented as vectors or n -tuples of information: the first argument of the n -tuple is the amount of commodity c_1 in individual i_1 's hands, the second argument of the n -tuple is the amount of commodity c_1 in individual i_2 's hands, and so on and so forth.

Arrow's definition of social states includes more information in what it is we choose and prefer than the basic commodity baskets view. Because of this increase in information we are able to show that what appeared to be reasonable violations of the α and β consistency properties are not actually violations at all. To see this consider again *Mangos*. Now, instead of modeling Bertha as preferring and choosing between pieces of fruit, we model her as preferring and choosing between *distributions* of fruit. These choice options can be fleshed out as is done in Table 1.

S₁

S₂

² Some, particularly in the revealed preference literature, might find this approach unobjectionable. Adopting this kind of response to fleshing out what it is we choose and prefer, however, significantly circumscribes the kinds of things rational choice theory can be employed to do, and thus stakes out a highly controversial account of what the purpose of rational choice theory is. These issues are explored in more detail in §4 below, when we examine the possible worlds account of what we choose and prefer.

(Bertha nothing, guest nothing)	(Bertha nothing, guest nothing)
(Bertha mango, guest nothing)	(Bertha mango, guest nothing)
(Bertha nothing, guest mango)	(Bertha nothing, guest mango)
(Bertha mango, guest apple)	(Bertha mango, guest apple)
(Bertha apple, guest nothing)	(Bertha apple, guest nothing)
(Bertha nothing, guest apple)	(Bertha nothing, guest apple)
(Bertha apple, guest mango)	(Bertha apple, guest mango)
(Bertha mango and apple, guest nothing)	(Bertha mango and apple, guest nothing)
(Bertha nothing, guest mango and apple)	(Bertha nothing, guest mango and apple)
	...
	(Bertha mango, guest mango)

Table 1

S_1 now consists of all possible permutations of fruit distributions between Bertha and the other dinner guest, as does S_2 (we do not list all possible permutations for S_2 because there are too many). As can be seen, S_1 is still a subset on S_2 . Importantly, though, the choice set for S_2 is most plausibly understood as the option (Bertha mango, guest mango), because Bertha cares deeply about whether the other guest can have her favorite piece of fruit. Since the choice set for S_2 is not an available choice option in S_1 , the α consistency property becomes inoperative, meaning *Mangos* no longer violates our rationality requirement. Similar considerations can show why *Papayas* does not violate the β consistency property as well.

Though Arrow’s method of enriching the information present in modeling what we choose and prefer can account for some putative violations of the α and β consistency properties, it cannot account for all of them. This is because of how Arrow defines social states. Though we have preferences over and choose between entities richer in information than mere commodities, the content of what we choose and prefer is limited to what we can call “economic matters”: the amount of each type of commodity in the hands of each individual, the amount of labor supplied by each individual, etc. On this view, we still cannot capture certain information that is relevant for determining whether a series of choices is rationally consistent or not.

To see this consider a new case, *Cocaine* (Sen 1993/2004: 130-131; Sen 1995: 25; Sen 1997/2004: 169). In *Cocaine* Dupree is faced with menu of options S_1 by his dinner host, which is the choice between tea or coffee. Dupree chooses coffee. Dupree is then faced with menu of options S_2 by his dinner host, which is the choice between tea, coffee, or cocaine. Frightened by being offered such a deadly drug, Dupree decides to head home empty handed. Clearly there is nothing irrational about Dupree's choice behavior in this case – indeed, most of us would probably behave in a similar manner. Yet on the social states account of modeling what we choose and prefer, Dupree's choice behavior violates α consistency. To see this turn to Table 2.

S_1	S_2
(Dupree nothing)	(Dupree nothing)
(Dupree coffee)	(Dupree coffee)
(Dupree tea)	(Dupree tea)
(Dupree coffee and tea)	(Dupree coffee and tea)
	(Dupree cocaine)
	(Dupree coffee and cocaine)
	(Dupree tea and cocaine)
	(Dupree coffee and tea and cocaine)

Table 2

Just like *Mangos*, S_1 is a subset on S_2 . As the story goes, the choice set for S_2 is the option (Dupree nothing), for he is frightened by being offered cocaine by his host. This means that our α consistency property requires that the choice set for S_1 must also be (Dupree nothing), for this is indeed an available choice option in S_1 . Yet by hypothesis the choice set for S_1 is (Dupree coffee), violating our requirement. So *Cocaine* violates the α consistency property even with Arrow's enriched account of social states, even though Dupree makes an intuitively reasonable set of choices in this case. Though Arrow's social states account was able to deal with some putative reasonable violations of our consistency properties, we still have not fully rescued the rationality of α and β .

4. Possible Worlds

Arrow's account of social states helps deal with some violations of the α and β consistency properties but not all of them. In trying to deal with all such violations one plausible strategy is to just carry Arrow's approach to the extreme. Why not just make the n -tuples we have preferences over and choose between *even bigger*, in the sense that they contain more information? Since information enrichment narrowed down violations of the α and β consistency properties when moving from mere commodity baskets to Arrow's social states, it is plausible to think that further information enrichment will reduce the violations even more so, to the point that they fall to zero.

Instead of following Arrow and saying that we choose and prefer complete descriptions of commodity allocations we can instead say that we choose and prefer *complete descriptions of worlds*. Here the philosophical literature on possible worlds is relevant. Some define possible worlds in a similar way to how Arrow defines social states, by referring to n -tuples of information. M.J. Cresswell, for instance, defines possible world W as being an n -tuple of space-time points, which when combined offer a complete description of W (Cresswell 1972). Though world W is just an n -tuple of space-time points, such space-time points can further be built up to describe all facts about world W . For instance, in *Cocaine*, choice problem S_1 imposes the choice between collection of space-time points W_1 (which entail the fact that Dupree possesses tea), the collection of space-time points W_2 (which entail the fact that Dupree possesses coffee), the collection of space-time points W_3 (which entail the fact that Dupree possesses both tea and coffee), and the collection of space-time points W_4 (which entail the fact that Dupree possesses neither tea nor coffee). But because W_1 - W_4 are *complete descriptions* of possible worlds W_1 - W_4 , all four collections of space-time points *also* entail the fact Dupree was *not* offered cocaine in either of the four worlds. The particular orderings of space-time points in the respective n -tuples entail this fact.

When faced with S_2 Dupree is faced with an entirely new set of possible worlds. These collections of space-time points will not only entail facts about specific commodity distributions for Dupree, but they will also contain facts about the actions of Dupree's host – namely, they will all entail the fact that, whatever commodities are in Dupree's possession, he was *also* offered cocaine. On this understanding of what we choose and prefer, worlds W_1 - W_4 which compose S_1 are not a subset on those worlds available at S_2 . S_1 and S_2 contain completely different worlds, with no intersection. As a result, the antecedent of the conditional for the α consistency property is not satisfied, meaning the property is inoperative. Moving from preferring over and choosing between Arrow's complete descriptions of social commodity allocations to complete descriptions of possible

worlds thus shows the rationality of Dupree's choice behavior in *Cocaine*. Moreover, it seems reasonable to speculate that this way of defining what we choose and prefer will solve all putative reasonable violations of α and β .

But a new worry arises. The α and β consistency properties become trivial in the sense that it is now impossible to violate them.³ The reason why it is impossible to violate α and β consistency properties on the possible worlds account is because the α and β consistency properties are properties that appraise choice acts that happen at different points in time. There must first be one choice act with a corresponding choice set and then there must be a second choice act with a corresponding choice set for the properties to become operative. With the first choice act we always face some set S_1 of menu options. On the current view, this is a set of possible worlds that are just n -tuples of space-time points. We then face another choice problem in form of some set S_2 of menu options. This too is a set of possible worlds that are just n -tuples of space-time points. But, because S_2 is temporally posterior to S_1 , all feasible options in S_2 entail the fact that a certain choice act happened at S_1 . That is, the n -tuples of space-time points at S_2 will all entail facts about what happened at S_1 because these n -tuples are meant to be *complete descriptions* of their respective possible worlds. Since this is true, the set of feasible n -tuples at S_2 will *necessarily* be an entirely different set of n -tuples than those available at S_1 . This being the case, it is impossible for S_1 to *ever* be a subset on S_2 , implying that the antecedents of the conditional α and β properties can never be satisfied. Since we can only show that these properties are violated when the antecedent is true and the consequent false, it follows that we can never show that the properties have been violated.

Though some might think it unproblematic that these conditions cannot be violated (Dowding 2001: 267), I think that this is a high cost. The reason why is because there is much more we want rational choice theory to do besides describe all choice behavior as instances of rational optimization. For instance, many want to use rational choice theory normatively, to both evaluate and prescribe behavior. If this is true then we certainly want it to be possible for people to violate the rationality axioms. If it is impossible for people to violate the rationality axioms then rational choice theory cannot be used to evaluate people's behavior, except in the sense that it always approbates people's behavior as rational. Moreover, if it is impossible to violate the rationality axioms then it is silly to tell people what they ought to do in order to be rational, because they will

³ Though no one has put forward the possible worlds account of what we choose and prefer both Sen (1995: 26; 1997/2004: 170-176) and Gaertner and Xu (1999: 174) worry that too much information enrichment results in the triviality of the consistency properties.

always be rational no matter what they do – though it is a truism that *ought implies can*, it is also the case that *ought presumes cannot*. Returning to the previous example, rational choice theory cannot tell Dupree what he should do in order that he may be rational, because he will always be rational no matter what it is he does.⁴ Though the possible worlds account is able to rid us of all putative violations of α and β , it does so at the cost of circumscribing what it is we can use rational choice theory to do.

5. The Dietrich-List Model

Though we have been looking at different ways of expanding the information present in what it is that rational agents choose and prefer, we have not paid attention to where this information comes from. Noticeably absent from our discussion thus far is what people *take themselves* to be preferring, and what people *take themselves* to be choosing, when they choose and prefer things. On Arrow's social states account, though people prefer and choose n -tuples of commodity distributions, they may not, in actually making a choice, be consciously choosing an entity so large. Yet the social states account says that when Bertha chooses the mango from S_2 she *is* choosing such a large-valued n -tuple, even if that is not what she takes herself to actually be choosing. The same applies to the possible worlds account. Perhaps the way to rescue the α and β properties while avoiding the negative implications of the possible worlds account is to derive an account of what we choose and prefer grounded in the choosing agent's perception of his or her choice problem.⁵

The best attempt at achieving this in the current literature is a model of rational choice developed in a series of important papers by Franz Dietrich and Christian List (Dietrich and List 2011; 2013a; 2013b; 2016). Now the Dietrich-List model is quite complex, but we can understand the basics of it, I think, in terms of three simple steps. First, we note that “when an agent chooses

⁴ Rulli and Worsnip (2016: §3) similarly criticize certain ways of individuating options (“the *de dicto* response”) by arguing that individuating options in such a way makes rational choice theory unable to perform certain functions we want it to perform.

⁵ There are several in the literature who propose something along these lines. One example is Caplin and Leahy (2001: 60) who “replace the standard prize space with a space of ‘psychological states,’ comprising a complete (for model purposes) description of the individual's state of mind.” Broome (1991: 103)'s *principle of individuation by justifiers* also includes the perception of choosing agents, as does Neumann (2007: 82)'s emphasis on “decision-sensitive features of the choice act.” Finally, Hausman (2011: 3-4)'s understanding of preferences as total comparative evaluations defines preferences as comparative evaluations over states of affairs based on everything *that matters* to the chooser. This too makes essential reference to the perception of the choosing agent.

between several options in some context... he or she perceives each option not as a primitive object, but as a bundle of properties” (Dietrich and List 2016: 182). That is, the set of choice options X is defined such that each choice option $x \in X$ can be written as an n -tuple $x = (x_1, x_2, \dots, x_n)$, where each x_k represents some property or feature of the choice option x .⁶ Here we do not see any inclusion of the perception of the choosing agent, but are instead roughly following the social states account and possible worlds account by understanding choice options as n -tuples of information, rather than pure objects as the commodity baskets account does.

Second: “although each option can have many properties, the agent considers not all of them, but only a subset: the *motivationally salient properties*” (Dietrich and List 2016: 182). That is, different properties or features x_k of choice options are either salient or not salient in certain decision contexts to choosing agents. So, in *Mangos*, Bertha could think being rude to guests by taking the last piece of most desirable fruit is salient. In *Cocaine*, Dupree could think that being offered cocaine is salient. More specifically, each choosing agent has a *motivational salience function*, where such a function “assigns to each choice context the properties the agent cares about in the context” (Dietrich and List 2016: 182). This is where Dietrich and List model the perception of the choosing agent: through the agent’s motivational salience function.

Third and finally, the choosing agent “chooses one option over another in the given context... if and only if his or her fundamental preference relation ranks the set of motivationally salient properties of the first option... above the set of the second” (Dietrich and List 2016: 182). That is, choosing agents are modeled not as having preferences over and choosing between choice options x, y, z in X , but rather over bundles of salient features. After this move the hope is that we can show how cases like *Mangos*, *Papayas*, and *Cocaine* are not really violations of the α and β consistency properties – thus offering a superior account to the commodity baskets account and social states account – in a manner that does not reduce the properties to triviality – thus offering a superior account to the possible worlds account.

⁶ Technically, it is not choice options that have properties on the Dietrich-List model, but choice options *in contexts* that have properties (what Dietrich and List call *option-context pairs*) (Dietrich and List 2016: 186; 188-189). So a mango *simpliciter* does not have properties, but rather a mango in the context of menu S_1 has properties, a mango in the context of menu S_2 has properties, and so on and so forth. (If a mango has the property p in *every* possible menu then we say that p is an *option property* of the mango. We can thus think of option properties as intrinsic properties of choice options x, y , and z .)

To get a better feel for the Dietrich-List model let us return to *Mangos*. When Bertha confronts menu S_1 in *Mangos* she confronts, according to the first step of the Dietrich-List model, choice options further broken down into bundles of properties. Now in S_1 there are two choice options: a mango and an apple. The mango can be understood as a bundle of properties: it has a sweet taste, it is the last piece of everyone's favorite fruit, it still has a grocery store sticker on it, it is slightly bruised, and so on and so forth. The apple can also be understood as a bundle of properties: it only has a semi-sweet taste, it is *not* the last piece of everyone's favorite fruit, it still has a grocery store sticker on it, it is *not* bruised, and so on and so forth.

When Bertha confronts menu S_2 she also confronts choice options broken down into bundles of properties, but some of the properties here will be different.⁷ Given the context, we suppose the apple has the same bundle of properties: it only has a semi-sweet taste, it is *not* the last piece of everyone's favorite fruit, it still has a grocery store sticker on it, it is *not* bruised, etc. But now in the context of menu S_2 each mango will have different properties than the single mango in S_1 (both mangos, we suppose, have the same properties): both have a sweet taste, both are *not* the last piece of everyone's favorite fruit, both have a grocery store sticker on it, both are slightly bruised, and so on and so forth. Noticeably different here is that both mangos no longer – in the context of menu S_2 – have the property of being the last piece of everyone's favorite fruit, because by hypothesis there are two mangos present in S_2 in comparison to menu S_1 , so taking one mango still leaves another mango.⁸

Continuing on to the second step of the Dietrich-List model, Bertha's motivational salience function assigns to both menus S_1 and S_2 those features of the choice options which are motivationally salient for Bertha. Let us suppose that, given Bertha's evaluative commitments, Bertha only cares about the sweetness of the fruit and also whether she takes the last piece of everyone's favorite fruit, which would be terribly rude of her and which she wants to avoid doing. From here, by the third step of the Dietrich-List model, we model Bertha's choice behavior *only* over

⁷ Continuing our discussion from the footnote above, on the Dietrich-List model, there are three kinds of properties option-context pairs may have: *option properties*, which depend solely on the nature of the choice option; *context properties*, which depend solely on the context the choice option is confronted in; and *relational properties*, which depend on both the option and the context (Dietrich and List 2016: 186). This richer account of properties – particularly context properties and relational properties – allows the *same* choice option (e.g., a mango) to have *different* properties in different contexts.

⁸ Here, the Dietrich-List model would somehow have to account for the fact that if the choosing agent chooses both mangos then they *would* be taking the last bit of everyone's favorite fruit. The model could do this by understanding the choice options here not as pieces of fruit, but as distributions of fruit as the social states account does, such that each distribution where both mangos are selected would then have the property last of everyone's favorite. This suggested revision changes nothing of the forthcoming analysis.

the relevant motivationally salient properties, rather than *all* of the properties of the choice options. This is depicted in Table 3.

S ₁	S ₂
(sweet, last of everyone's favorite)	(sweet, not last of everyone's favorite)
(semi-sweet, not last of everyone's favorite)	(sweet, not last of everyone's favorite)
	(semi-sweet, not last of everyone's favorite)

Table 3

Notice here that S₁ is no longer a subset on S₂: the choice option (sweet, last of everyone's favorite), which is present in S₁, is no longer an available choice option in S₂. As a result, *Mangos* no longer violates the α consistency property, for the antecedent of the conditional is not satisfied. Moreover, the Dietrich-List model does not have to worry about those issues that plagued the possible worlds account, for there is no reason to think that choosers will *never* be able to step into the same menu of options twice. Indeed, if Bertha's evaluative commitments were such that her salience function only assigned motivational salience to the property of sweetness, then S₁ *would* be a subset on S₂ and, if she chose the apple from S₁ and a mango from S₂, then she would have indeed violated property α , which intuitively seems like the correct result given this altered understanding of Bertha's evaluative commitments.

It is plausible to think that the Dietrich-List model can show why all putative reasonable violations of the α and β consistency properties are not actually violations of these properties in a non-trivial manner. For this reason it is an incredibly successful model. Indeed, if the Dietrich-List model is the best we can do then we will have done very well for ourselves. But still, I think there are some interesting cases that the Dietrich-List model has trouble accounting for. The worry is that in modeling the perception of the choosing agent the two authors understand this solely in terms of a motivational salience function: my perception of a choice problem is cashed out in terms of my salience function, which picks out the properties of choice options relevant to my decision in given contexts. But sometimes our perception of choice problems cannot fully be cashed out in terms of salience over bundles of pre-determined, objective properties of choice options in given contexts. Sometimes our perception of choice problems must be cashed out in terms of *determining what the features or properties of choice options are in the first place*.

Here is an example of this. Esau and Franklin are at the same dinner party as Bertha and confront fruit bowl S_1 , containing our mango and apple. Esau and Franklin are quite different from Bertha, though, in that both do not care about being rude by taking the last piece of fruit. Instead, they care only about the sweetness of the fruit – the sweeter the better – along with whether the fruit is bruised or not: both want a pristine piece of produce. As before when we modeled Bertha’s choice behavior in *Mangos*, when Esau and Franklin confront S_1 they confront choice options broken down into bundles of properties. The mango can be understood as a bundle of properties: it has a sweet taste, it is that last piece of everyone’s favorite fruit, it still has a grocery store sticker on it, it is slightly bruised, and so on and so forth. The apple can also be understood as a bundle of properties: it only has a semi-sweet taste, it is *not* the last piece of everyone’s favorite fruit, it still has a grocery store sticker on it, it is *not* bruised, and so on and so forth.

Now here it might seem obvious how the Dietrich-List model is to proceed: both Esau’s and Franklin’s salience functions assign salience to the sweetness properties of the respective fruits, and the bruised-ness properties of the respective fruits. The resulting menus are detailed in Table 4.

Esau’s S_1	Franklin’s S_1
(sweet, slightly bruised)	(sweet, slightly bruised)
(semi-sweet, not bruised)	(semi-sweet, not bruised)

Table 4

But there is a problem here. Esau is from a wealthy Western liberal democracy and shops exclusively at Whole Foods. As such, a slight blotch will make him deem a piece of fruit bruised, and as a result not choice-worthy. Moreover, Esau has typical taste buds and does indeed agree that mangos are quite sweet, whereas apples are only semi-sweet. Franklin, on the other hand, is from a primitive foraging society where a slight blotch is common and would not count as bruised to him: to be a bruised piece of fruit for Franklin, the fruit would have to be soft all over and brown on the inside. Not only this, but because Franklin is not accustomed to eating genetically engineered produce (which S_1 consists of) he thinks both the mango and the apple he confronts in S_1 are off-the-charts sweet, able to draw no difference between them in terms of their sweetness.

Now we can suppose that Esau’s menu of options as displayed in Table 4 accurately describes Esau’s perception of his choice problem at S_1 : when he sees the mango he sees a sweet, slightly bruised piece of fruit; and when he sees the apple he sees a semi-sweet, not bruised piece of

fruit. But Franklin's perception of his choice problem at S_1 is *not* accurately described by Table 4. Here, when Franklin looks at the same mango as Esau he sees a sweet, not bruised piece of fruit, and when he looks at the same apple as Esau he sees a sweet, not bruised piece of fruit. As such, Franklin's menu of options as displayed in Table 4 does not accurately model his perception of the choice problem at S_1 . If what we are concerned with is empirical prediction, then the Dietrich-List model will likely fall short when it comes to predicting Franklin's choice behavior. And, if we are more generally interested in maintaining all of the interesting and relevant information in how we model choice problems then again the Dietrich-List model falls short: Franklin's menu at S_1 as depicted in Table 4 does not accurately capture all of the information relevant to Franklin's choice. Focusing on the perception of the choosing agent when modeling rational choice as Dietrich and List do is without a doubt the right way forward, but the way Dietrich and List attempt to do this does not fully succeed.

6. The Perspectival Model

The Dietrich-List model succeeded where all other models failed, but still came with a cost of its own: there were interesting cases where the perception of choosing agents could not fully be captured in terms of a motivational salience function assigning salience to bundles of objective, pre-determined properties of choice options in given contexts. To remedy such failings we develop a new model of rational choice by turning first to the literature in political philosophy – particularly the public reason liberalism tradition – on moral and evaluative diversity. We begin by introducing the notion of a *perspective*.

Very broadly, we can understand perspectives as mental schemata or internal languages we impose on reality that mediate our experience. A bit more specifically, Scott Page defines perspectives as mappings between objects in the external world and one's internal language (Page 2007: 31).⁹ We can think of these mappings as imposing a sort of ontology: though we all confront the same reality, the way we code this reality in our internal languages can be different for we may employ different mapping relations – when this happens, individuals will “see” different worlds even though, at rock bottom, it is the same external world they confront. To put it technically, the domain of everyone's perspective function is the same, yet the output of these functions can differ. To give

⁹ See further Gaus (2016: 43-44); Muldoon (2016: ch. 3).

an example many in the public reason tradition are quite interested in, though a Christian and an atheist both confront the same external reality, they interpret this reality differently and, as a result, see very different worlds: the Christian sees a world whose ontology includes spirits and souls due to her perspective; the atheist – when he interprets this same external reality – sees no such thing due to his differing perspective (Gaus 2016: 162-163). More relevant to the current paper: when one individual sees a piece of fruit as bruised, a different individual can look at this same piece of fruit and see no such thing. When one individual sees a piece of fruit as sweet a different individual can look at this same piece of fruit and come to no such conclusion.

Using these informal insights as a jumping off point we now develop what shall be called the *perspectival model* of rational choice. On the perspectival model, let $X = \{x, y, z, \dots\}$ be the set of all choice options, and let $X^\wedge = X_1 \times X_2 \dots \times X_l$ be the set of all possible l -tuples where each X_k denotes the set of all things that can be considered as a particular feature k of some choice option. Each X_k contains the element 0, which stands for “is not a decision-relevant feature of the choice option,” and is assigned to a choice option anytime feature k is not relevant to the choosing agent’s decision problem. If we let K stand for a non-empty subset on X (i.e., a context or menu of options), then individual i has a perspective function p_i where $p_i: (x, K) \rightarrow X^\wedge$.¹⁰

For each $x \in X$, let $\mathbf{x}_K^i = (x_1^i, \dots, x_l^i)$ be the choice option seen from individual i ’s perspective in context K . That is, let $\mathbf{x}_K^i = (x_1^i, \dots, x_l^i)$ be the output of $p_i(x, K)$. When $\mathbf{x}_K^i \neq \mathbf{x}_K^j$, this means that individuals i and j assign different properties to choice option x in context K . Inversely, if $\mathbf{x}_K^i = \mathbf{x}_K^j$, then individuals i and j assign the same properties to choice option x in context K . We now model persons as preferring and choosing between choice options as *they* perceive them and assign properties to them. So if menu S_1 consists of choice options $x, y,$ and z , individual i has preferences over and chooses between $\mathbf{x}_{S_1}^i, \mathbf{y}_{S_1}^i, \mathbf{z}_{S_1}^i$ when she confronts S_1 , and individual j has preferences over and chooses between $\mathbf{x}_{S_1}^j, \mathbf{y}_{S_1}^j, \mathbf{z}_{S_1}^j$ when she confronts S_1 .

It is worth further highlighting the differences between the perspectival model and the Dietrich-List model, for both are very similar in that both accounts attempt to model the perception

¹⁰ Instead of defining a context as merely a subset on X , one could here offer more detail by following the Dietrich-List model in defining a context K as an ordered pair (Y, λ) , where Y is a subset on X , and λ a parameter that specifies further features of the choice environment (Dietrich and List 2016: 185). This latter object λ allows us to account for the fact that individuals might face the same menus (subsets on X) at times t_1 and t_2 but perceive very different choice problems if, say, they are sober at t_1 and drunk at t_2 .

of choosing agents. On the Dietrich-List model, individuals are confronted with choice options in contexts understood as bundles of properties. Importantly, though, these bundles of properties do not reflect the perception of the choosing agent. Rather, the bundles of properties are inherent features of option-context pairs (Dietrich and List 2016: 186; 188-189). Because the perception of choosing agents is solely contained in each agent's motivational salience function, these properties are meant to be objective features of option-context pairs that could plausibly make a difference to the choosing agent, and are not meant to reflect the perception of the choosing agent. The examples Dietrich and List give of such properties are telling here: a container of yogurt, for instance, may have the property of being fruit-flavored, being fat-free, being free of artificial sweeteners, whether the yogurt was sustainably produced, and so on and so forth (Dietrich and List 2016: 182).

On the perspectival model, however, the relevant properties of choice options in contexts are not chosen by the modeler, but rather are determined by the choosing agent's perspective.¹¹ Since each agent's perspective function is where we model the perception of the choosing agent instead of Dietrich's and List's motivational salience function, the properties assigned to choice options in a given context by the perspective function of the choosing agent may permissibly reflect the perception of the choosing agent: Esau can look at a piece of fruit and perceive it as bruised, whereas Franklin can look at this same fruit and perceive it as not bruised. Moreover, properties of choice options may now permissibly be value-laden: for instance, Bertha can assign to a mango the property of rudeness if she perceives choosing this option as being rude in the given context.

Now beyond merely assigning properties to choice options, perspective functions are also meant to capture Dietrich's and List's important insight that the salience of certain properties matters when it comes to modeling choice behavior. The fact that each set X_k contains the element 0 allows the perspectival model to include this: if feature k of a choice option is not relevant to individual i 's choice behavior in the current context then, when p_i assigns features to the current choice options under consideration, the k^{th} feature of all such options will contain the argument 0.

¹¹ Thus far we have been postulating the existence of a perspective function to explain choices an agent makes, but we have not yet explained why it is we should think persons have perspective functions in the first place. A fuller account of the perspectival model will need to address why it is we should think persons have perspectives as we have defined them. Work on perspectives and evaluative diversity more generally could possibly fill such gaps. See here Page (2007); Gaus (2016); Muldoon (2016). Moreover, for the strictly positivists we have not yet specified how an external observer can know the nature of a choosing agent's perspective function. Note that given the complex nature of perspectives – as mappings from choice options in contexts to elements in X^{\wedge} – it is far more difficult to determine the nature of an agent's perspective than, say, an agent's preferences over brute choice options as defined by the commodity baskets account.

In doing so the hope is that the perspectival function is able to model the perception of choosing agents in two different ways: first (*i*) in how an agent’s perception determines the relevant properties of choice options; and second (*ii*) in how an agent’s perception determines which properties of choice options are relevant to the current decision at hand.

Let us return to *Mangos* to see the perspectival model in action. When Bertha confronts menus S_1 and S_2 what choice options does she face? That depends on her perspective, p_B . For simplicity we represent all choice options in two dimensional space, where the first argument of our tuple signifies how sweet the piece of fruit is, and the second argument whether choosing the piece of fruit will be rude or not – again, because properties of choice options are determined by the choosing agent’s perspective and not the modeler as is the case with the Dietrich-List model, properties of choice options may permissibly be value-laden. We simplify and represent all choice options as existing in two dimensional space because for every other possible feature of the relevant choice options Bertha’s perspective assigns the element 0, as these features are not relevant to her choice at hand in the given context. Given the story as we have thus far told it, Bertha’s perspective defines the relevant choice options as displayed in Table 5.¹²

S_1	S_2
(sweet, rude)	(sweet, not rude)
(semi-sweet, not rude)	(sweet, not rude)
	(semi-sweet, not rude)

Table 5

Importantly, S_1 is not a subset on S_2 in this particular case, so the α consistency property has not been violated: the option (sweet, rude) which is available in S_1 is not available in S_2 . Indeed, even if S_1 were a subset on S_2 , Bertha’s choice of (sweet, not rude) from S_2 is not an available choice option in S_1 . As such, the perspectival model correctly deems that Bertha’s choice behavior in *Mangos* is not irrational.

It is plausible to think that the perspectival model of what we choose and prefer will be able to show that cases like *Mangos*, *Papayas*, and *Cocaine* are really not violations of the α and β consistency properties. This gives us reason to endorse the perspectival account over the commodity

¹² Returning to footnote eight above, the perspectival model will have to account for the fact that choosing both mangos from S_2 would be deemed rude by Bertha. The suggested revision in the above footnote for the Dietrich-List model could be applied here as well, *mutatis mutandis*.

baskets account and Arrow’s social states account, for it rescues the rationality of α and β . Furthermore, the perspectival model is superior to the possible worlds account, for the model allows for the α and β consistency properties to actually be violated. Indeed, if Bertha’s perspective p_B did not deem rudeness to be a decision-relevant feature of the choice options in the contexts of S_1 and S_2 (thus assigning 0 to this feature), then S_1 would be a subset on S_2 and, if Bertha chose a single mango from S_2 and the single apple from S_1 then she would have violated the α property, which intuitively seems like the correct result.

But the Dietrich-List model was *also* able to address all putative violations of the α and β consistency properties in a manner that does not reduce the properties to triviality. Recall our main worry with the Dietrich-List model: there are some cases where a choosing agent’s perception of a choice problem is best understood not in terms of salience over pre-determined properties of option-context pairs, but rather as *determining* what the relevant properties of these option-context pairs are in the first place. The Dietrich-List model had trouble accounting for this, which led to an inability to accurately model certain decision problems. This was displayed with the case of Esau and Franklin.

On the perspectival model, the fact that Esau’s and Franklin’s perspective functions allow them to assign different properties to choice options allows us to better account for the differing perceptions of the relevant choice options of our two choosing agents. Here, Esau and Franklin will see different menus of options, even though, on the most plausible way of modeling the two respective menus on the Dietrich-List model, Esau and Franklin see the same menus. This is displayed in Table 6.¹³

Esau’s S_1	Franklin’s S_1
(sweet, slightly bruised)	(sweet, not bruised)
(semi-sweet, not bruised)	(sweet, not bruised)

Table 6

In contrast to Table 4, Table 6 accurately models how Esau and Franklin perceive their choice options. Esau, the shopper of Whole Foods, looks at the mango and sees a sweet piece of fruit that is slightly bruised, and looks at the apple and sees a semi-sweet piece of fruit that is in pristine

¹³ We here suppose that Esau and Franklin assign 0 to every other feature of the respective pieces of fruit besides their sweetness properties and their bruised-ness properties.

condition. Franklin, from the primitive foraging society, looks at these same pieces of fruit and sees a mango that is quite sweet and not bruised, and an apple that is also quite sweet and not bruised. This is because on the perspectival model perception can be cashed out in terms of determining the properties of choice options, in comparison to the Dietrich-List model, where perception can *only* be cashed out in terms of salience over objective properties of choice options, determined by the modeler.

By a weak dominance argument, then, the perspectival account is the best account of what we choose and prefer: it plausibly solves all putative violations of the α and β consistency properties in a manner that does not reduce the properties to triviality. Moreover, it is able to better account for the perception of choosing agents by allowing persons to assign properties to choice options based on their perception of these choices options, rather than just assigning salience to objective, pre-determined properties of choice options. There is one thing left to do. We must examine the conclusions Sen draws from cases like *Mangos*, *Papayas*, and *Cocaine* in conjunction with the commodity baskets account to see if these conclusions still hold when we adopt the perspectival account.

One of Sen's takeaways was that we should not totally give up on internal consistency conditions as requirements of rationality – we should just apply them carefully. In some domains of choice internal consistency makes sense as a requirement of rationality; in other domains of choice it does not. This conclusion depends heavily on how we define what it is we choose and prefer. When all that matters is commodity baskets – say, when studying how consumers behave in the marketplace – then we expect people to be consistent in their choice over these commodities. However, when things matter besides mere commodities – say, when examining how people choose in the political arena – then it is not surprising that people are inconsistent in the way they choose commodity baskets. But since perspectives are mental schemata we impose on *any* domain of choice we enter, unique perspectives for unique domains of choice will allow us to hold agents accountable to internal consistency in areas besides consumer theory. Because agents can approach the political arena with unique perspectives that set the menu options they face, we can hold these agents accountable to consistent choice given the menus their perspectives impose, regardless the domain of choice. This means we can hold on to our intuitive requirements of rationality in all domains of choice.

Sen's other takeaway was that we cannot determine rationality from internal consistency of the choice function alone. We must also look to external reference to assess rationality. This means we need to look beyond the x 's, R 's, and y 's to determine whether agents are behaving rationally or not. When one adopts the perspectival account of what we choose and prefer this conclusion is circumscribed greatly. When we observe the behavior of choosing agents and (i) we employ the same perspective they do or (ii) there is sufficient overlap between our perspective and the chooser's perspective such that the ontology they impose on choice problems S_1 and S_2 produce the same choice options that our perspective does, then we do not need external reference to judge the rationality of their actions. In such cases we can judge the rationality of behavior strictly in terms of α and β consistency. But when we do not share a perspective with other agents, or there is insufficient overlap in our perspectives, then we *do* need to appeal to external reference in order to assess the rationality of behavior. The x 's, R 's, and y 's alone will not cut it. As an example, if one shares the same perspective as Bertha, or a similar enough perspective that imposes the same ontology on Bertha's menu options as Bertha's perspective does, then one can judge Bertha's behavior as rational without appealing to external referents, *contra* Sen. But now consider the perspective of Esau. Because of Esau's commitments and the ontology these commitments impose on the menu options, Esau's perspective may deem Bertha's choice behavior as irrational. External reference is here required.

But note that Esau's appeal to external reference does not imply that Bertha *is* irrational on the current proposal. Since it is Bertha's perspective that sets her menu options, she may very well choose rationally even though Esau cannot see the rationality absent appeal to external reference. Compare this to Sen's commodity baskets account. On such a view, not only must we appeal to external reference to make sense of Bertha's behavior, but even once we have made such an appeal her behavior is still, technically speaking, in violation of α and β . This is because Bertha, on such an account, chooses over commodity baskets, not whatever it is we appeal to in understanding her behavior. But on the perspectival account, even when Esau needs to appeal to external reference to explain the rationality of Bertha's behavior, it does not mean that her behavior *is* in violation of the consistency properties. It is rational and satisfies α and β consistency because it is Bertha's perspective that sets the menu, not Esau's. So not only do we need to appeal to external reference less than Sen originally thought, but even when we do need to appeal to external reference to make

sense of behavior it does not damn those we observe as irrational. Rather, it damns us and our perspectives.

Works Cited

- Arrow, Kenneth J. 1951/2012. *Social Choice and Individual Values*. New Haven: Yale University Press.
- Broome, John. 1991. *Weighing Goods: Equality, Uncertainty, and Time*. Oxford: Basil Blackwell.
- Caplin, Andrew and John Leahy. 2001. "Psychological Expected Utility Theory and Anticipatory Feelings." *The Quarterly Journal of Economics* 116: 55-79.
- Cresswell, M.J. 1972. "The World is Everything that is the Case." *Australasian Journal of Philosophy* 50: 1-13.
- Dietrich, Franz and Christian List. 2011. "A Model of Non-Informational Preference Change." *Journal of Theoretical Politics* 23: 145-164.
- Dietrich, Franz and Christian List. 2013a. "A Reason-Based Theory of Rational Choice." *Noûs* 47: 104-134.
- Dietrich, Franz and Christian List. 2013b. "Where do Preferences Come From?" *International Journal of Game Theory* 42: 613-637.
- Dietrich, Franz and Christian List. 2016. "Reason-Based Choice and Context-Dependence: an Explanatory Framework." *Economics and Philosophy* 32: 175-229.
- Dowding, Keith. 2002. "Revealed Preference and External Reference." *Rationality and Society* 14: 259-284.
- Gaertner, Wulf and Yongsheng Xu. 1999. "Rationality and External Reference." *Rationality and Society* 11: 169-185.
- Gaus, Gerald. 2016. *The Tyranny of the Ideal: Justice in a Diverse Society*. Princeton: Princeton University Press.
- Hausman, Daniel M. 2011. *Preference, Values, Choice, and Welfare*. Cambridge: Cambridge University Press.
- Hicks, J.R. 1939. *Value and Capital: An Inquiry into Some Fundamental Principles of Economic Theory*. Oxford: Oxford University Press.

- Muldoon, Ryan. 2016. *Social Contract Theory for a Diverse World: Beyond Tolerance*. New York: Routledge.
- Neumann, Michael. 2007. "Choosing and Describing: Sen and the Irrelevance of Independence Alternatives." *Theory and Decision* 63: 79-94.
- Page, Scott E. 2007. *The Difference: How the Power of Diversity Creates Better Groups, Firms, Schools, and Societies*. Princeton: Princeton University Press.
- Rulli, Tina and Alex Worsnip. 2016. "IIA, Rationality, and the Individuation of Options." *Philosophical Studies* 173: 205-221.
- Samuelson, Paul. 1947. *Foundations of Economic Analysis*. Cambridge: Harvard University Press.
- Sen, Amartya. 1974/1982. "Choice, Orderings, and Morality." In *Choice, Welfare, and Measurement*: 74-83. Cambridge: Harvard University Press.
- Sen, Amartya. 1977/1982. "Social Choice Theory: A Re-Examination." In *Choice, Welfare, and Measurement*: 158-200. Cambridge: Harvard University Press.
- Sen, Amartya. 1993/2004. "Internal Consistency and the Act of Choice." In *Rationality and Freedom*: 121-157. Cambridge: Harvard University Press.
- Sen, Amartya. 1995. "Is the Idea of Purely Internal Consistency of Choice Bizarre?" In *World, Mind, and Ethics: Essays on the Ethical Philosophy of Bernard Williams*, edited by J.E.J. Althman and Ross Harrison: 19-31. Cambridge: Cambridge University Press.
- Sen, Amartya. 1997/ 2004. "Maximization and the Act of Choice." In *Rationality and Freedom*: 158-205. Cambridge: Harvard University Press.