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# Free choice reasons

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**Abstract** I extend theories of nonmonotonic reasoning to account for reasons allowing free choice. My approach works with a wide variety of approaches to nonmonotonic reasoning and explains the connection between reasons for kinds of action and reasons for actions or subkinds falling under them. I use an Anderson–Kanger reduction of reason statements, identifying key principles in the logic of reasons.

**Keywords** Reasons · Defeasible reasoning · Buridan's ass · Deontic logic

My goal in this paper is to extend theories of nonmonotonic reasoning to an account of reasons allowing free choice that

- Works with a wide variety of approaches to nonmonotonic reasoning, and
- Explains the connection between reasons for kinds of action and reasons for actions or subkinds falling under them in a way that avoids unpleasant consequences facing existing nonmonotonic theories of reasons.

Most reasons allow free choice and ground, at most, general *oughts* rather than *oughts* pertaining directly to actions.

## 1 Introduction

Two recent analyses of reasons in deontic logic—those of Horty (1997, 2012), hereafter H, and of Nicholas Asher, Michael Morreau, and Daniel Bonevac (Asher 1995; Asher and Morreau 1991, 1995; Asher and Bonevac 1996, 1997; Morreau 1997a, b; Bonevac 1998, 2016), hereafter ABM—treat reason statements as defaults or defea-

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sible conditionals in a nonmonotonic logic. Though those theories differ in some important respects, they have much in common.

- They are nonmonotonic: adding premises to a defeasibly valid argument does not always preserve validity. Adding information can lead us to retract legitimately drawn conclusions.
- They share the assumption that "A reason for action is a premise of practical reasoning" (Setiya 2014, p. 221).[1]
- They analyze reason sentences—those of the form *That A would be a reason for B*, where the *would* removes what would otherwise include a commitment to *A*—as being or implying object language conditionals (ABM) or metalinguistic inference rules (H), thereby validating inference patterns analogous to those holding for conditionals in nonmonotonic logic.
- They also link reasons closely to obligation, seeing them as premises in practical arguments justifying obligation sentences. They thus share a strong form of the thought that reasons are reasons or evidence for *oughts* (Toulmin 1950, p. 144; Kearns and Star 2008, 2009).

H and ABM take reason sentences as defaults or conditionals of the form *If A, then (it ought to be the case that) B*, where the parenthetical phrase may be explicit ($A > OB$, in ABM, where $>$ is a defeasible conditional connective, one for which modus ponens is defeasibly but not deductively valid) or implicit ($A \rightarrow B$, in H, where $\rightarrow$ abbreviates a normal default in default logic (Reiter 1980)). On both accounts, reasons defeasibly justify *oughts*: *That A would be a reason for B* combines with $A$ to yield, defeasibly ($\mid\!\approx$), that it ought to be the case that $B$. In a slogan, reasons ground *ought*s.

(1) *Ground of Obligation*: $A$, $A$ is reason for $B \mid\!\approx OB$

That I promised you a horse, for example, would be reason for me to give you a horse. So, by (1), the argument.

(2) a. I promised you a horse.
b. That I promised you a horse would be reason for me to give you a horse.
c. So, I should give you a horse.

should be defeasibly valid. It is not deductively valid; my reasoning might be undercut or overridden by other considerations. And reasons *not* to give you a horse might outweigh my promise.

These theories yield counterintuitive results if the reasons involved allow free choice. Buridan's ass, for example, faces two equidistant and equally attractive piles of hay. He is hungry; he has reason to eat from one pile or the other, but no reason, we might think, to eat from either pile in particular. He is free to choose any of the piles. His reason, in other words, at most grounds an *ought* for a *kind* of action, but not directly for any particular action falling under that kind. Whether or not we say he has reason to eat from the pile on the left, for example, we surely should not say that he *ought* to eat from that pile. We can construct a similar case in which there are piles of

[1] To avoid commitments about the metaphysical nature of reasons (see, e.g., Alvarez 2010, 2016; Hyman 2015), we might say more cautiously that reasons are specified by premises of practical reasoning.

hay, oats, and milo; his reason would then ground an *ought* for a kind of action but not directly for any more specific subkind. H and ABM imply, in such cases, that either the agent has no reason to perform any action at all, or the agent has a reason and thus, defeasibly, ought to do everything falling under the kind. ABM has the further consequence that in such circumstances the agent has a reason to do and, thus, ought to do anything you like.

## 2 Reasons allowing free choice

Practical reasoning involving free choice reasons is ubiquitous. Here are some examples:

(3) *Buridan's Ass*: A hungry donkey stands before two equidistant and equally attractive piles of hay. He has reason to eat from some pile, but, allegedly, no reason to eat from any particular pile.[2]

(4) *Buridan's Fifteenth Sophism—I owe you a horse*:

> ... in return for some good service that you performed for me, I promised you one good horse, and I obligated myself before a competent judge to give you one good horse... [But] I no more owe you Blackie than Tawny, since I no more promised you this one than the other, and I could equally satisfy [you] with the one just as with the other; therefore, it follows that if Blackie is not owed by me to you, then neither is Tawny, for the same reason, and so on for the other horses (Buridan 1977, p. 85; 2001, pp. 907–908).

I have reason to give you a horse, but, one might think, no reason to give you any particular horse.

(5) *Imperfect Obligations*: Imperfect obligations allow the agent latitude: "though the act is obligatory, the particular occasions of performing it are left to our choice" (Mill 1861; see O'Neill 1996; Rainbolt 2000). Reasons in practical arguments for imperfect obligations may ground *oughts* for a kind of action without doing so for any subkind or any particular action of that kind.[3]

[2] This problem appears originally in Aristotle, who speaks "of the man who, though exceedingly hungry and thirsty, and both equally, yet being equidistant from food and drink, is therefore bound to stay where he is" (*De Caelo* II 13 295b32–35; Buridan comments on this passage in his unpublished *Expositio Textus De Caelo*, where his example concerns a dog (Rescher 1959, p. 154)). A version of the puzzle reappears in al-Ghazali, who summarizes the position of "the philosophers" (primarily Avicenna): "Indeed, if in front of a thirsty person there are two glasses of water that are similar in every respect in relation to his purpose [of wanting to drink], it would be impossible for him to take either..." (Al-Ghazali 2000, I, 41, pp. 32–39). It appears most poetically in Dante: "Between two foods alike in appetite, and like afar, a free man, I suppose, would starve before either of them he would bite" (*Paradiso* III, Canto IV, quoted in Rescher 1959, p. 152). The fabled donkey first appears in the writings of Buridan's critics.

[3] Mill's formulation suggests another way to understand the distinction between perfect and imperfect obligations, as narrow-scope and wide-scope obligations, respectively. Where $x$ is some person or action, perfect obligations have the form $\exists x\, OA(x)$, and imperfect obligations have the form $O\exists x A(x)$ (with no commitment to $\exists x\, OA(x)$). Assuming constant domains, $\exists x\, OA(x)$ implies $O\exists x A(x)$. But the reverse does not hold. So, the situation described can recur for any *de dicto* obligation, whether or not it would traditionally be considered imperfect.

(6) *Positive Rights*: Positive rights or entitlements impose obligations that something be done for the person possessing the right, but not on any particular person to perform any particular act. They ground *oughts* for a kind of action without doing so for any particular action or agent. My right to a jury trial, for example, does not in itself impose an obligation on a particular person.
(7) *Prichard's Paradox*: Prichard (1932) argues that obligations should not be understood as directed toward actions: "Can an obligation really be an obligation to do some *action*, and, if not, what should be substituted for the term 'action'?" We might extend Prichard's question to reasons. Just as an obligation is always an obligation to perform a kind of action, a reason is always a reason for a certain kind of action to be performed; it is never sufficient for any particular action. That I owe you a dollar is reason for me to give you a dollar, but not to give you any particular bills or coins.[4]

These examples have a similar structure, which we might express in terms of disjunction or existential quantification. Buridan's ass adds factors beyond that structure by assuming the relevant indiscernibility of available options (Chislenko 2016), so I will focus instead on Buridan's fifteenth sophism, thinking of Blackie and Tawny as the only two horses the debtor owns. In standard deontic logic (see, e.g., von Wright, 1951; Chellas 1980; Åqvist 1994, where $\supset$ is the material conditional and $\equiv$ the material biconditional), we might represent it as:

(8) a. I don't owe you Blackie. $\neg OGb$
b. I don't owe you Tawny. $\neg OGt$
c. Blackie and Tawny are my only two horses. $\forall x(Mx \equiv (x = b \vee x = t))$
d. I don't owe you a horse that isn't mine. $\forall x(\neg Mx \supset \neg OGx)$
e. Therefore, I don't owe you a horse. $\neg\exists x OGx$ (valid) or $\neg O\exists x Gx$ (invalid)

There is no particular horse I owe you. But it is absurd to think that I have no obligation to give you some horse or other. I am not free of my debt. What the argument shows is that I have some choice about how to fulfill it. $O(A \vee B)$, $\neg OA$, $\neg OB$ are consistent, as are $O(A \vee B \vee C)$, $\neg OA$, $\neg OB$, $\neg OC$, etc.; generalizing, $O\exists x Gx$ is consistent with $\neg\exists x OGx$. In every world in which I fulfill my obligations, I give you a horse, but I can give you different horses in different worlds.

Buridan's sophism is more troubling construed as concerning reasons:

(9) a. I have no reason to give you Blackie (as opposed to Tawny).
b. I have no reason to give you Tawny (as opposed to Blackie).
c. Blackie and Tawny are my only two horses.
d. I have no reason to give you a horse that isn't mine.
e. Therefore, I have no reason to give you a horse.

The parenthetical expressions are important; I have no *contrastive* reason to give you Blackie, a reason that would apply to Blackie but not Tawny.[5] (Contrastive reasons

[4] Jonathan Dancy suggested the idea of applying Prichard's question to reasons. The example is Buridan's: "*Debeo tibi denarium*" (1977, p. 83).

[5] In speech, we would normally express the thoughts leading to the puzzle by using emphasis: I have no reason to give you *Blackie*. This is not equivalent to the sentence without emphasis, for it sets up a contrast class (Rooth 1992).

are reasons for one thing as opposed to another; for an argument that all reasons are contrastive, see Snedegar 2013, 2014, 2017). The puzzling conclusion (9)d arises from assuming that, if I have no contrastive reason to do something, I have no reason to do it; or, as Jon Kvanvig has expressed it,

> Reason $R$ is a reason to do $A$ (or believe $p$) only if, for any $B$ (or $q$) that competes with $A$ (or $p$), $R$ is a reason to do $A$ rather than $B$ (or believe $p$ rather than believe $q$) (Kvanvig 2005, 2006).

As he observes, this underlies skeptical moves in the theory of knowledge: I have reason to believe that this is a zebra, one might think, only if I have a reason to believe that it is a zebra instead of a cleverly painted mule. In general, I have reason to believe or do something only if I have reason to believe or do *it* instead of relevant alternatives.

Intuitively, however, this seems wrong; as Kvanvig argues, I can have a reason to perform an action without having a contrastive reason to perform it. I do appear to have some sort of reason to give you Blackie, namely, that I promised you a horse. We might think a reason to give you a horse is, other things being equal, a reason to give you Blackie. It is also a reason to give you Tawny.

The 'other things being equal' clause is important. Consider this headline:

> Nietzsche's ideas might have been dangerous, but that's no reason to ban a club dedicated to the man (Howard Jacobson, *The Independent* 13 June, 2014).

That Nietzsche's ideas are dangerous would be reason to do something to discourage allegiance to them, but it would not thereby be reason to do *anything* that might discourage allegiance to them. Similarly, that I promised you a horse is reason to give you a horse, but not thereby a reason to give you my favorite horse, if other options are available. Consider this contrast: The first argument seems acceptable, but the second does not.

(10) a. I have a reason to give you a horse.
b. Blackie is one of my horses.
c. Therefore, I have a reason to give you Blackie.

(11) a. I have a reason to give you a horse.
b. Blackie is one of my horses.
c. Blackie is my favorite horse.
d. I have other horses that would suit you better than Blackie would.
e. Therefore, I have a reason to give you Blackie.

We might accept the conclusion of (11), thinking that I do have a reason to give you Blackie—namely, that I owe you a horse—but other reasons not to give you Blackie. I am inclined, however, to reject (11), taking those reasons against giving you Blackie as blocking my reason to give you a horse from becoming a reason to give you Blackie.

The theory I shall develop explains both intuitions. To anticipate: I have a *pro tanto* reason to give you Blackie, but not an on-balance, these-things-considered reason. In a nonmonotonic system designed to explicate the defeasibility of our practical conclusions, we do not achieve all-things-considered conclusions and thus generally do not reach conclusions about all-things-considered reasons. We allow for the possibility that additional information might overturn our conclusions. We do, however, strive for conclusions that reflect the information given and would hold if it were all the relevant information. Our conclusions are thus, typically, best understood as on-balance, these-things-considered conclusions. When the conclusion is a reason statement, we most naturally read it as concerning an on-balance, these-things-considered reason. But of course we might still read it as a *pro tanto* reason statement of the kind typically found in the premises of practical inferences.

## 3 The free choice puzzle

On H or ABM, thinking that a reason to give you a horse is *ceteris paribus* a reason to give you Blackie leads to trouble. Do I have a reason to give you Blackie? If not—because I have no contrastive reason to give you *Blackie* as opposed to any other horse I own—then giving you Blackie would be something I have no reason to do. If so—because I owe you a horse!—I ought to give you *every* horse I own. And that may be the least of my obligations; I may be obliged to do anything at all. A similar dilemma emerges for every reason allowing free choice.

Sentences such as *I have reason to give you Blackie or Tawny* and *I have reason to give you a horse* are ambiguous. Free choice readings of reason statements take the disjunction in *I have reason to give you Blackie or Tawny* and the existential quantifier in *I have reason to give you a horse* as narrow scope. That I promised to give you a horse, in Buridan's case, is a reason for me to give you a horse, Blackie or Tawny—my choice.[6]

Suppose that I have a reason to give you Blackie or Tawny in the free choice sense. On H and ABM it does not follow, even defeasibly, that I have a reason to give you Blackie. Nor does it follow that I have a reason to give you Tawny. On H: $A \rightarrow (B \vee C)$ does not defeasibly imply $A \rightarrow B$; $A$ and $A \rightarrow (B \vee C)$ do not defeasibly imply $B$.[7] On ABM: $A > O(B \vee C)$ does not defeasibly imply $A > OB$. $A$ and $A > O(B \vee C)$ do not defeasibly imply $OB$.

Hereafter, to eliminate the need for duplication and to keep the deontic character of the inferences explicit, I will mix the notations of these theories, writing $A \rightsquigarrow OB$ where Horty would have $A \rightarrow B$ and ABM would have $A > OB$. Both theories use defeasible conditionals; it is important to remember that modus ponens—in our mixed notation, $A, A \rightsquigarrow B, \therefore B$—is valid only defeasibly. In these terms, then, the point is that $A \rightsquigarrow O(B \vee C)$ does not defeasibly imply $A \rightsquigarrow OB$. Similarly, $A \rightsquigarrow O\exists x B(x)$ does not defeasibly imply $A \rightsquigarrow OB(a)$.

6 Where the disjunction represents different epistemic possibilities rather than freedom to choose, in contrast, the disjunction or existential quantifier has wide scope. We can read *I have reason to give you Blackie or Tawny—I'm not sure which* as *(I have reason to give you Blackie) or (I have reason to give you Tawny)*. Fox (2012, 2015) makes an analogous point with respect to imperatives; compare the two readings of *Buy some teak or mahogany—whichever you prefer* as opposed to *whichever is in stock*. See also Kaufmann (2012).

7 This framing ignores a limitation of Horty's system, which relies on the default logic of Reiter (1980); a default such as $A \rightarrow B$ never appears as the conclusion of an argument. Gelfond et al. (1991) and Brewka (1992) have investigated expanding default logic to allow defaults to be derived from other defaults. As Horty's system stands, the equivalent point would be that, in a default theory with the single default $A \rightarrow (B \vee C)$, the defaults $A \rightarrow B$ and $A \rightarrow C$ would be inadmissible; they could enlarge the set of consequences.

Suppose we were to think, in opposition to these theories, that my promise to give you a horse *is* a reason to give you Blackie. We might feel attracted to principles like these:

(12) *Disjunctive Reasons*: If $A$ would be reason for $(B_1 \vee \ldots \vee B_n)$, then other things being equal $A$ would be reason for $B_i$, $1 \leq i \leq n$, provided that $B_1 \wedge \ldots \wedge B_n$ is consistent with $A$.

(13) *Existential Reasons*: If $A$ would be a reason for $\exists x B(x)$, then other things being equal $A$ would be a reason for $B(a)$, for any constant $a$ substituted for free occurrences of $x$ in $B(x)$, provided that $\forall x B(x)$ is consistent with $A$.[8]

Inferences from $A$ *would be reason for* $(B \vee C)$ to $A$ *would be reason for* $B$, and from $A$ *would be a reason for* $\exists x B(x)$ to $A$ *would be a reason for* $B(a)$ would thus hold defeasibly. I have reason to give you a horse; it is reasonable to conclude that I have reason to give you Blackie. But additional information might lead me to retract that conclusion—including information that I have already discharged my obligation by giving you another horse.

We cannot add such principles to H or ABM, however, for two reasons. First, these theories defeasibly imply

(14) *Reasons for Conjunctions*: If $A$ would be a reason for $B$ and $A$ would be a reason for $C$, then other things being equal $A$ would be a reason for $B \wedge C$, provided that $B \wedge C$ is consistent with $A$.

H and ABM validate principles of consequent conjunction for defaults or conditionals, in terms of which analyze reason statements. So, if my promise would be reason to give you Blackie and reason to give you Tawny, it would be reason to give you Blackie and Tawny.

Second, Ground of Obligation commits them to

(15) *Multiple Obligations*: $A$, $A$ would be a reason for $B$, and $A$ would be a reason for $C$ defeasibly imply $OB$, $OC$, and $O(B \wedge C)$, provided that $B \wedge C$ is consistent with $A$.

(Details and proofs are in the next two sections—see (22) and (33) below). I promised you a horse. That I promised you a horse is a reason for me to give you Blackie. It is also a reason for me to give you Tawny. There is no contradiction in my giving you both. Other things being equal, therefore, I ought to give you Blackie, and I ought to give you Tawny.

But (12) in combination with these principles causes trouble. Say that my promise would be a reason for me to give you Blackie or Tawny. By Disjunctive Reasons, that would be a reason for me to give you Blackie. It would also be a reason for me to give you Tawny. By (14), it would be a reason to give you both horses! But I have no reason to give you both. By (23), or by (1) and (14), moreover, I *ought* to give you both Blackie and Tawny. By analogous reasoning, the principle of Existential Reasons would defeasibly imply that if my promise is a reason to give you a horse, it is a reason to give you every horse I have. Call this the *Greedy Reasons Problem*.

[8] Assume for the sake of simplicity that each object in the domain has a constant in the language designating it.

There is an even more serious problem for ABM: the *Exploding Reasons Problem*. Adding a Principle of Disjunctive Reasons to ABM would trivialize it. $A$ and *$A$ is a reason for $B$* would allow us to conclude defeasibly $OC$, for arbitrary $C$, for both theories accept:

(16) *Deontic Weakening*: If $A \models B$, $OA \models OB$.

and ABM additionally accepts a principle of weakening of the consequent for defeasible conditionals. If my promise would be a reason to give you Blackie, it would be a reason for me to give you Blackie or the plague. That would defeasibly imply, by Disjunctive Reasons, that I have a reason to give you the plague, and that I ought to do it. Adding a Principle of Existential Reasons would have much the same effect. Suppose that I promised to give you a horse, and that such a promise is a reason for me to give you a horse. It would follow defeasibly that I ought to give you the plague.

## 4 H

This section justifies claims just made about H in some technical detail. The key result: H entails Reasons for Conjunctions and Multiple Obligations and so suffers from the Greedy Reasons Problem. Readers willing to take that on faith can skip to Sect. 6.

Horty (2012) builds his analysis on Reiter's (1980) default logic, and restricts himself to normal default rules, written $A \rightarrow B$. $Premise(A \rightarrow B) = A$; $Conclusion(A \rightarrow B) = B$. If $S$ is a set of defaults, then $Premise(S) = \{Premise(\delta) : \delta \in S\}$; $Conclusion(S) = \{Conclusion(\delta) : \delta \in S\}$. If $\delta$ and $\delta'$, etc., are defaults, $\delta < \delta'$, a strict partial ordering (irreflexive and transitive), indicates that $\delta'$ has higher priority than $\delta$; *$\delta'$ is stronger than $\delta$*.

A *fixed priority default theory* $T$ is a triple $\langle W, D, < \rangle$ consisting of a set $W$ of facts and a set $D$ of defaults, strictly partially ordered by $<$. A *scenario* $S$ based on $T = \langle W, D, < \rangle$ is any subset $S \subseteq D$ of defaults in $T$. The *belief set* or *extension* $E$ generated by a scenario $S$ on a theory $\langle W, D, < \rangle$ is $Th(W \cup Conclusion(S))$. Note that all extensions are deductively closed. A default is triggered if its premise is entailed by the conclusions of the defaults in that scenario together with the facts.

$$Triggered_{W,D}(S) = \{\delta \in D : W \cup Conclusion(S) \vdash Premise(\delta)\}$$

*Reasons* are premises of triggered defaults.

Call a default *conflicted* if the agent is already committed to denying its conclusion.

$$Conflicted_{W,D}(S) = \{\delta \in D : W \cup Conclusion(S) \vdash \neg Conclusion(\delta)\}$$

A default is *defeated* in a scenario if the scenario triggers a stronger default with a conflicting conclusion, and *binding* if it is triggered and neither conflicted nor defeated.

A *stable scenario* based on a default theory $T$ contains all and only the defaults that are binding on $T$. Setting aside exclusionary reasons for the sake of simplicity, a *proper scenario* based on $T$ is any stable scenario on $T$. A *proper extension* of $T$ is an extension of a proper scenario based on $T$. A proper extension extends the facts by using all and only the binding defaults: those that are triggered but neither conflicted nor defeated. The consequences $C(T)$ of $T$ are the sentences holding in every proper extension of $T$.

Horty offers two definitions of *ought*, based on credulous and skeptical strategies. Here I focus only on the skeptical:

(17) *Skeptical ought*: $OA$ holds in $T$ iff $A$ holds in every proper extension of $T$.

Horty offers two definitions of conditional *ought*s as well. Let the fixed priority default theory amplified by $X$, $\Delta[X]$, be $\langle W \cup \{X\}, D, < \rangle$. The skeptical definition:

(18) *Skeptical conditional ought*: $O(A/X)$ holds in $T$ iff $A$ holds in every proper extension of $\Delta[X]$.

Horty's defaults are metalinguistic rules; they do not appear in conclusions of arguments, and cannot strictly speaking be said to stand in entailment relations. But we can define a relation among defaults that corresponds, intuitively, to something like entailment. Say that $\delta_1, \ldots, \delta_n \implies \delta_{n+1}$ iff $\delta_{n+1}$ is admissible in any proper extension of a default theory containing $\delta_1, \ldots, \delta_n$—iff, that is, adding $\delta_{n+1}$ to the theory's defaults would yield no additional consequences. Say that $\delta \Leftrightarrow \delta'$ iff $\delta \implies \delta'$ and $\delta' \implies \delta$. And say that $OA \implies OB$ iff $OB$ holds in every default theory in which $OA$ holds. Then we have:

(19) *Deontic Weakening*: If $A \models B$, $OA \implies OB$.

*Proof* Say that $OA$ holds in default theory $T$. Then $A$ holds in every proper extension of $T$. Since extensions are closed under classical consequence and $A \models B$, $B$ holds in every extension of $T$. Thus, $OB$ holds in $T$. □

(20) *Consequent Conjunction*: $(A \to B) \wedge (A \to C) \implies A \to (B \wedge C)$.

*Proof* $(A \to B) \wedge (A \to C) \implies A \to (B \wedge C)$ iff $A \to (B \wedge C)$ is admissible in any default theory containing $A \to B$ and $A \to C$. So, suppose $T$ contains $A \to B$ and $A \to C$, and that $T'$ is just like $T$ except for its additional default $A \to (B \wedge C)$. Assume that $D$ holds in $T'$ but not $T$. Then it holds in all proper extensions of $T'$, but there is some proper extension $E$ of $T$ in which it fails. Since $D$ holds in every proper extension of $T'$, $E$ is not a proper extension of $T'$, since $D \notin E$. That can only be because $E$ extends a scenario $S$ that contains all and only the defaults binding on $T$, but not on $T'$. That could only happen if $S$ does not contain $A \to (B \wedge C)$, which is triggered and neither conflicted nor defeated in $S$. Since $A \to (B \wedge C)$ is triggered, $W \cup Conclusion(S) \vdash A$. So, $A \to B$ and $A \to C$ are triggered on $S$. Since $A \to (B \wedge C)$ is not conflicted on $S$, $W \cup Conclusion(S) \nvdash \neg(B \wedge C)$. So, $W \cup Conclusion(S) \nvdash \neg B$ (or $\neg C$). Thus, neither $A \to B$ nor $A \to C$ are conflicted on $S$. For the same reason, since $A \to (B \wedge C)$ is not defeated on $S$, neither are $A \to B$ or $A \to C$. So, both $A \to B$ and $A \to C$ are binding on $S$. So, since $D \notin E$, $W \cup \{F_1, \ldots, F_n, B, C\} \not\models D$, but $W \cup \{F_1, \ldots, F_n, B, C, B \wedge C\} \models D$. Since $F_1, \ldots, F_n, B, C \models B \wedge C$, this is impossible. □

(21) *Reasons for Conjunctions*: If $A$ would be a reason for $B$ and $A$ would be a reason for $C$, then $A$ would be a reason for $B \wedge C$.

*Proof* (20) implies that any default theory containing $A \to B$ and $A \to C$ can admit $A \to (B \wedge C)$ without enlarging its set of consequences. So, any theory on which $A$ can count as reason for $B$ and for $C$ is one in which $A$ can count as reason for $B \wedge C$. □

(22) *Multiple Obligations*: $A$, $A$ would be a reason for $B$, and $A$ would be a reason for $C$ defeasibly imply $OB$, $OC$, and $O(B \wedge C)$, provided that $B \wedge C$ is consistent with $A$.

*Proof* Assume $A$, $A$ would be a reason for $B$, and $A$ would be a reason for $C$, where $B \wedge C$ is consistent with $A$. We need to show that $B$, $C$, and $B \wedge C$ hold in every proper extension $E$ of $T = \langle\{A\}, \{A \to B, A \to C\}, \emptyset\rangle$. Both $A \to B$ and $A \to C$ are triggered in $E$, since $E$ contains $A$. Neither is defeated, for there are no stronger defaults. And neither is conflicted, since $B \wedge C$ is consistent with $A$. So, $A \to B$ and $A \to C$ are binding in E. Hence $T$ itself is the only proper scenario on $T$, and $A$, $B$, $C$, and $B \wedge C$ all hold in $Th(\{A\} \cup Conclusion(T))$. So, $OB$, $OC$, and $O(B \wedge C)$ all hold in $T$. □

(23) *The Greedy Reasons Problem (H)*: In H,

a. Disjunctive Reasons (12) entails that $A$, $A$ would be a reason for $B_1 \vee \ldots \vee B_n$ defeasibly imply $O(B_1 \wedge \ldots \wedge B_n)$, if $B_1 \wedge \ldots \wedge B_n$ is consistent with $A$;
b. Existential Reasons (13) entails that $A$, $A$ would be a reason for $\exists x B(x)$ defeasibly imply $O\forall x B(x)$ if $\forall x B(x)$ is consistent with $A$.

*Proof* (a) Assume (12), that $A$ and $A$ would be a reason for $B_1 \vee \ldots \vee B_n$ on $T$, and that $B_1 \wedge \ldots \wedge B_n$ is consistent with $A$. By (12), $A$ is also a reason for each $B_i$, $1 \leq i \leq n$, in $T$. So, let $T = \langle\{A\}, \{A \to (B_1 \vee \ldots \vee B_n),\ A \to B_1, \ldots,\ A \to B_n\}, \emptyset\rangle$. Let $S$ be a proper scenario on $T$. $A \to (B_1 \vee \ldots \vee B_n),\ A \to B_1, \ldots,\ A \to B_n$ are all triggered on $S$, given the presence of $A$ among the facts of $S$. None are defeated, since there are no stronger defaults, and none are conflicted, since $B_1 \wedge \ldots \wedge B_n$ is consistent with $A$. Therefore, each default is binding in $S$. Every extension of $S$ thus contains $A$, $B_1$, …, $B_n$ together with their deductive consequences, including $B_1 \wedge \ldots \wedge B_n$. So, $OB_1$, …, $OB_n$, $O(B_1 \wedge \ldots \wedge B_n)$ all hold in $T$.

(b) Assume (12), that $A$ and $A$ would be a reason for $\exists x B(x)$ on $T$, and that $\forall x B(x)$ is consistent with $A$. By (12), $A$ is also a reason for each $B(a)$, for any constant $a$ substituted for free occurrences of $x$ in $B(x)$, in $T$. So, let $T = \langle\{A\}, \{A \to \exists x B(x),\ A \to B(a_1),\ A \to B(a_2), \ldots\}, \emptyset\rangle$. Let $S$ be a proper scenario on $T$. $A \to \exists x B(x)$, $A \to B(a_1)$, $A \to B(a_2)$, … are all triggered on $S$, given the presence of $A$ among the facts of $S$. None are defeated, since there are no stronger defaults, and none are conflicted, since $\forall x B(x)$ is consistent with $A$. Therefore, each default is binding in $S$. Every extension of $S$ thus contains $A$, $B(a_1)$, … together with their deductive consequences, including $\forall x B(x)$. So, $OB_1$, …, $OB_n$, $O(\forall x B(x))$ all hold in $T$. □

## 5 ABM

This section substantiates claims made about ABM in some technical detail. The key results: ABM too entails Reasons for Conjunctions and Multiple Obligations and so suffers from both the Greedy and Exploding Reasons Problems.

Say that a *deontic conditional* is a conditional with an *ought* in its consequent, such as *If you promised to go, you ought to go*. ABM defines reasons straightforwardly:

Reasons are (true) antecedents of true deontic conditionals.

*A would* be a reason for $B$ iff $A > OB$. $O$ is an obligation operator interpreted in terms of standard deontic logic: where $i(w)$ is a nonempty set of ideal worlds assigned to each world $w$,

$OB$ is true at $w$ if and only if $i(w) \subseteq B$.

Since $i(w)$ is nonempty, $OB$ contradicts $O\neg B$.

ABM rests on a pivotal-valuation-based conception of defeasible reasoning quite different from that of default logic (Makinson 2005). Say that $X \models A$ iff there are no models in which every sentence in $X$ is true but $A$ is false. Call such models *counterexamples* to the inference from $X$ to $A$.

ABM starts from the basic conditional logic **C** (Priest 2008, pp. 84–87), reading a conditional $A > B$ as *If A, then normally (typically, generally, other things being equal, provided conditions are suitable) B*. Let $[A]$ be the set of $A$-worlds, the worlds in which $A$ is true. Let $f$ be a Lewis-style selection function: $f_w[A]$ is the set of worlds in which conditions are suitable for assessing (relative to $w$) what happens when $A$. $A > B$ is true at world $w$ iff $B$ is true at all worlds in which conditions are suitable for assessing (relative to $w$) what happens when $A$:

$A > B$ is true at world $w$ iff $f_w[A] \subseteq [B]$, that is, iff $B$ is true in all $A$-normal worlds.

**C** is weak, validating weakening of the consequent ($A > B \models A > (B \vee C)$), consequent conjunction ($A > B, A > C \models A > (B \wedge C)$), $A > \top$, and substitution of logical equivalents. Modus ponens, transitivity, strengthening of the antecedent, modus tollens, and contraposition all fail for $>$, which is what we would want for any defeasible conditional, since these inference patterns should be valid, if at all, only defeasibly.

ABM adopts three added constraints:

(24) *Facticity*: $f_w[A] \subseteq [A]$ (validating $A > A$)
(25) *Nontriviality*: $f_w[A] = \emptyset \implies [A] = \emptyset$
(26) *Disjunction*: $f_w[A \cup B] \subseteq f_w[A] \cup f_w[B]$

The last validates $A > C, B > C \models (A \vee B) > C$.

Some worlds are more regular than others, in the sense that they involve fewer exceptions to generalizations expressed by defeasible conditionals than others (Morreau 1997a).

World $w$ is *irregular with respect to A* iff, at $w$, there is a modus ponens failure with respect to $A$: for some $B$, $A > B$ and $A$ are true at $w$ but $B$ is false at $w$.

World $w$ is *as regular as* $w'$ if, whenever $w$ is irregular with respect to $A$, so is $w'$; $w$ is *more regular* than $w'$ if $w$ is as regular as $w'$ but not vice versa.

A counterexample to an inference is *gratuitous* if there are *models* of the inference—models of the premises in which the conclusion is true—that are more regular.

An argument is *deductively valid* if it has no counterexamples, and *defeasibly valid* if all counterexamples to it are gratuitous.

That is, for every counterexample to a defeasibly valid argument, there is a more regular model of it. If an argument is defeasibly valid, its premises *defeasibly imply* its conclusion.

For detailed discussion of ABM as a deontic logic, including its treatment of deontic paradoxes, see Bonevac (1998); for its analysis of reasons, see Bonevac (2016).

(27) *Weakening*: If $B \models C$, then $A > B \models A > C$.

*Proof* Assume $B \models C$. Let $A > B$ be true at $w$. By the truth condition for the conditional, $f_w[A] \subseteq [B]$. Since $[B] \subseteq [C]$, $f_w[A] \subseteq [C]$. So, $A > C$ is true at $w$. Thus, $A > B \models A > C$. □

(27) *Deontic Weakening*: If $A \models B$, $OA \models OB$.

*Proof* Say $A \models B$, and let $OA$ hold at $w$. Then $A$ holds at all $w$'s ideals; $i(w) \subseteq [A]$. Since $[A] \subseteq [B]$, $i(w) \subseteq [B]$. So, $OB$ holds at $w$. □

(29) *Agglomeration*: $O(A \wedge B)$ iff $(OA \wedge OB)$.

*Proof* $O(A \wedge B)$ holds at $w$ iff $i(w) \subseteq [A \wedge B]$. Since $[A \wedge B] = [A] \cap [B]$, that holds iff $i(w) \subseteq [A] \cap [B]$, which holds iff $i(w) \subseteq [A]$ and $i(w) \subseteq [B]$, which holds iff $OA \wedge OB$ holds at $w$. □

(30) *Consequent Conjunction*: $(A > B) \wedge (A > C) \models A > (B \wedge C)$.

*Proof* Assume that $A > B$ and $A > C$ hold at $w$. By the truth condition, $f_w[A] \subseteq [B]$ and $f_w[A] \subseteq [C]$, so $f_w[A] \subseteq [B] \cap [C]$; thus, $f_w[A] \subseteq [B \wedge C]$. So, $A > (B \wedge C)$ holds at $w$. □

(31) *Weaker Reasons*: If $A$ would be a reason for $B$, $A$ would be a reason for $B \vee C$.

*Proof* Say $A > OB$ holds at $w$. Then $f_w[A] \subseteq [OB]$. $[OB] = \{w' : i(w') \subseteq [B]\}$. Let $w' \in f_w[A]$. Then $w' \in [OB]$, so $i(w') \subseteq [B] \subseteq [B \vee C]$. So, $w' \in [O(B \vee C)]$. Thus, $f_w[A] \subseteq [O(B \vee C)]$. So, $A > (B \vee C)$ holds at $w$. □

(32) *Reasons for Conjunctions*: If $A$ would be a reason for $B$ and $A$ would be a reason for $C$, then $A$ would be a reason for $B \wedge C$.

*Proof* Say $A$ would be a reason for $B$ and $A$ would be a reason for $C$ at $w$; $A > OB$ and $A > OC$ both hold at $w$. By Consequent Conjunction, $A > (OB \wedge OC)$ holds at $w$. Thus, by Agglomeration, $A > O(B \wedge C)$ holds at $w$. □

(33) *Multiple Obligations*: $A$, $A$ would be a reason for $B$ and $A$ would be a reason for $C$ defeasibly imply $OB$, $OC$, and $O(B \wedge C)$.

*Proof* If $[A] = \emptyset$, we have our result; if there are no counterexamples, there are no non-gratuitous counterexamples. So, assume that $A$ is consistent. Say that $A$, $A > OB$, and $A > OC$ hold in $w$. By (35), $A > O(B \wedge C)$ also holds in $w$. $f_w[A] \subseteq [OB]$, $f_w[A] \subseteq [OC]$, and $f_w[A] \subseteq [O(B \wedge C)]$. □

By Nontriviality (25), $f_w[A] \neq \emptyset$. Thus, $f_w[A] \cap [OB] \cap [OC] \cap [O(B \wedge C)] \neq \emptyset$. By Facticity (24), $[A] \cap [OB] \cap [OC] \cap [O(B \wedge C)] \neq \emptyset$.

Suppose that $w \notin [OB]$. Then $w$ is irregular with respect to $A > OB$; $w \notin f_w[A]$. Since $A$, $OB$, $OC$, and $O(B \wedge C)$ are jointly consistent, however, there is a more regular model of $A$, $A > OB$, and $A > OC$ in which $OB$, $OC$, and $O(B \wedge C)$ are all true. The same holds if $w \notin [OC]$ or $w \notin [O(B \wedge C)]$. So, any counterexample to the inference is gratuitous.

(34) *The Greedy Reasons Problem (ABM)*: In ABM,

a. Disjunctive Reasons (12) entails that $A$, $A$ would be a reason for $B_1 \vee \ldots \vee B_n$ defeasibly imply $O(B_1 \wedge \ldots \wedge B_n)$, provided that $B_1 \wedge \ldots \wedge B_n$ is consistent with $A$;

b. Existential Reasons (13) entails that $A$, $A$ would be a reason for $\exists x B(x)$ defeasibly imply $O\forall x B(x)$, provided that $\forall x B(x)$ is consistent with $A$.

*Proof* (a) Assume (12), that $B_1 \wedge \ldots \wedge B_n$ is consistent with $A$, and that $A$, $A > O(B_1 \vee \ldots \vee B_n)$ hold in $w$. Then by (12) $A > OB_i$ holds in $w$ for each $B_i$, $1 \leq i \leq n$. So, $A$, $A > O(B_1 \vee \ldots \vee B_n)$ is equivalent to $A$, $A > O(B_1 \vee \ldots \vee B_n)$, $A > OB_1, \ldots, A > OB_n$. By Multiple Obligations (33), that set defeasibly implies $OB_1, \ldots, OB_n, O(B_1 \wedge \ldots \wedge B_n)$.

(b) Assume (13), that $\forall x B(x)$ is consistent with $A$, and that $A$, $A > O\exists x B(x)$ hold in $w$. By (13), $A > OB(a)$, for any constant $a$ substituted for free occurrences of $x$ in $B(x)$, provided that $\forall x B(x)$ is consistent with $A$. So, $A$, $A > O\exists x B(x)$ is equivalent to $A$, $A > O\exists x B(x)$, $A > OB(a_1)$, $A > OB(a_2)$, .... By Multiple Obligations, this defeasibly implies $OB(a)$ for each $a$. By the compactness of ABM, we thus obtain $\forall x OB(x)$, which, by Agglomeration, is equivalent to $O\forall x B(x)$. □

(35) *The Exploding Reasons Problem (ABM)*: Disjunctive Reasons (12) entails that $A$, $A > OB \mathrel{|\!\!\approx} OC$, provided that $B \wedge C$ is consistent with $A$.

*Proof* Assume that $B \wedge C$ is consistent with $A$. By Weaker Reasons, $A$, $A > OB$ is equivalent to $A$, $A > OB$, $A > O(B \vee C)$. By disjunctive reasons, $A$, $A > O(B \vee C)$ defeasibly implies $OB$, $OC$, and $O(B \wedge C)$. Adding $A > OB$ to those premises cannot lead us to retract a conclusion, since $OB$ is already among the conclusions. So, $A$, $A > OB \mathrel{|\!\!\approx} OB$, $OC$, and $O(B \wedge C)$. □

## 6 Nonmonotonic frameworks

My goal is to provide an analysis of reasons involving free choice that

- Works across a wide range of approaches to nonmonotonic inference;
- Accepts the principles of Disjunctive and Existential Reasons, allowing us to infer defeasibly a reason to give you Blackie, for example, from a reason to give you Blackie or Tawny, and from a reason to give you a horse; and
- Avoids the Greedy and Exploding Reasons Problems.

Let's begin with the first desideratum. H and ABM differ in their underlying nonmonotonic approaches, and there is no consensus on a theory of common sense reasoning;

indeed, it is not clear that there can be a single comprehensive theory of nonmonotonic inference. I assume no particular theory of nonmonotonic inference here, striving instead to craft a theory applicable across a wide array of nonmonotonic logics. There are many formalisms in the literature (for surveys, see, e.g., Brewka et al. 1997; Makinson 2005). I assume that any viable theory defines a nonmonotonic implication relation $\mid\!\approx$ with the following properties (where $X$ is a set of formulas, $A, B, \ldots$ are formulas, $\rightsquigarrow$ is a defeasible conditional or default,[9] $\Longrightarrow$ is a metalinguistic conditional, and $\models$ is classical, monotonic entailment). The first three derive from natural assumptions about defeasible inference (Gabbay 1985; Antonelli 2005, p. 9):

(36) a. *Supraclassicality*: $X \models A \Longrightarrow X \mid\!\approx A$
b. *Cut*: $X \mid\!\approx A,\ X, A \mid\!\approx B \Longrightarrow X \mid\!\approx B$
c. *Cautious Monotony*: $X \mid\!\approx A,\ X \mid\!\approx B \Longrightarrow X, A \mid\!\approx B$

Any consequence relation satisfying Supraclassicality and Cut also satisfies:

(37) *Closure*: $X \mid\!\approx A,\ A \models B \Longrightarrow X \mid\!\approx B$

*Proof* Assume that $X \mid\!\approx A$ and $A \models B$. By $\models$'s monotonicity, $X, A \models B$. By Supraclassicality, $X, A \mid\!\approx B$. So, by Cut, $X \mid\!\approx B$. □

The next three represent central benchmarks for theories of nonmonotonic inference (Lifschitz 1989).

(38) a. *Defeasible Detachment*: $A,\ A \rightsquigarrow B \mid\!\approx B$ (but not $A,\ A \rightsquigarrow B \models B$)
b. *Diamond*: $A, B,\ A \rightsquigarrow C,\ B \rightsquigarrow \neg C \not\mid\!\approx C\ (\neg C)$
c. *Specificity*: $A, B,\ A \rightsquigarrow C,\ (A \wedge B) \rightsquigarrow \neg C \mid\!\approx \neg C$ (but again not with $\models$)

The final two stem naturally from thinking of conditionals nonmonotonically (see, e.g., Hawthorne 1998) in a logic containing quantifiers, and hold both in ABM and a straightforward quantificational extension of H.

(39) a. *Rule of Passage*: $\forall x(A \rightsquigarrow F(x)) \Leftrightarrow A \rightsquigarrow \forall x F(x)$ ($x$ not free in $A$)
b. *Rule of Passage*: $\forall x(F(x) \rightsquigarrow A) \Leftrightarrow \exists x F(x) \rightsquigarrow A$ ($x$ not free in $A$)

I will interpret these broadly, to include their sentential analogues:

(40) a. *Consequent Conjunction*: $(A \rightsquigarrow F(a_1)) \wedge \ldots \wedge (A \rightsquigarrow F(a_n)) \Leftrightarrow A \rightsquigarrow (F(a_1) \wedge \ldots \wedge F(a_n))$
b. *Disjunctive Antecedents*: $(F(a_1) \rightsquigarrow A) \wedge \ldots \wedge (F(a_n) \rightsquigarrow A) \Leftrightarrow (F(a_1) \vee \ldots \vee F(a_n)) \rightsquigarrow A$[10]

[9] Note that material implication and counterfactual conditionals violate (38)a, b, and c and so are not suitable candidates for this connective.

[10] The most attractive accounts of nonmonotonic reasoning for my purpose are therefore based on pivotal valuation accounts (e.g., circumscription (McCarthy 1980; Lifschitz 1994), KLM (Kraus et al. 1990), or commonsense entailment (Asher 1995; Morreau 1997a)), since they automatically satisfy (40)b (Makinson 2005). Disjunctive Antecedents can however be added to theories based on pivotal rule accounts such as default logic (Reiter 1980; Horty 2012) or theories using maxfamily operations (Makinson and Torre 2000).

## 7 A theory of free choice reasons

Now, on to the second desideratum: to craft a theory that accepts the principles of Disjunctive and Existential Reasons. My theory consists of four components:

- An analysis of reasonableness;
- An analysis of *pro tanto* reasons;
- An analysis of on-balance reasons; and
- A thesis reversing the link between reasons and obligations. Instead of claiming that reasons defeasibly imply obligations, my theory asserts that obligations defeasibly imply reasons.

We need to be able to say that an agent has a reason to act in a certain kind of way (e.g., giving you a horse), that a determinate action that falls under that kind (e.g., giving you Blackie, or performing this particular act of giving you a horse) would be done for that reason, but that the agent does not thereby have a reason to do all actions (e.g., also giving you Tawny) falling under it. The situation is analogous to free choice permission (Kamp 1973, Dignum et al. 1996, Zimmermann 2000, Barker 2010, Fusco 2014a, b). *You may have soup or egg roll* defeasibly implies that you may have soup. It defeasibly implies that you may have egg roll. But it does not imply, even defeasibly, that you may have both (Asher and Bonevac 2005). Similarly, that I have reason to give you a horse defeasibly implies that I have reason to give you Blackie. But it does not imply that I have reason to give you all my horses.

Suppose we pursue the analogy with free choice permission, and follow (Asher and Bonevac 2005) in thinking of it as strong permission. We analyze *You may A* as *It's OK to A*, which we construe as *It's OK if A*, that is, $A > OK$. Accordingly, we analyze *You may have soup or salad* as *If you have soup or you have salad, it's OK*.

What you have reason to do, pursuing the analogy, might be sometimes best represented as the *antecedent* of a conditional: If you do what you have reason to do, you are being reasonable. H and ABM, by treating what you have reason to do as the *consequent* of a default or defeasible conditional, cannot distinguish *each* from *all*. There seems to be a distinction between *Each talent is such that I have reason to develop it* and *I have reason to develop all my talents*. Similarly, there seems to be a difference between *Each of my horses is such that I have reason to give it to you* and *I have reason to give you all my horses*. But $\forall x(A \rightsquigarrow ODx)$ and $A \rightsquigarrow O\forall x Dx$ are equivalent, assuming constant domains, where $x$ is not free in $A$.[11] If a reason statement places what it is reason *for* in the antecedent of a defeasible conditional or default rule, however, there is no problem: $\forall x(ODx \rightsquigarrow A)$ and $O\forall x Dx \rightsquigarrow A$ are not equivalent.

I introduce a propositional constant $\alpha$ (for *aitia*) analogous to Asher and Bonevac's $OK$, meaning *minimal demands of reason are satisfied*, where the minimal demands are that actions have some rational support—that agents act on the basis of reasons.

My theory consists of these four principles:

[11] I am again abstracting away from a limitation of Horty's system, since default logic, as Reiter and Horty develop it, is purely sentential. A natural quantificational extension, however, would make $\forall x(A \rightsquigarrow B)$ and $A \rightsquigarrow \forall x B$ equivalent, where $x$ is not free in $A$.

(41) a. *Strong Rational Permission*: *A is reasonable* iff $A \rightsquigarrow \alpha$. That is, $A$ has rational support iff, if $A$ were the case, then, other things equal, minimal demands of reason would be met.
b. *Cicero's Thesis*: $OA \mid\!\approx (A \rightsquigarrow \alpha)$. *Ought* implies *reasonable*. Obligations defeasibly entail reasons; rational support is defeasibly necessary for obligation.
c. *Pro Tanto Reasons*: *That A is a pro tanto reason for B* iff $A \rightsquigarrow (B \rightsquigarrow \alpha)$—if $A$ were the case, $B$ would, other things equal, be reasonable.
d. *On-Balance Reasons*: *That A is a reason for B*, given $X$ iff $X, A \mid\!\approx B \rightsquigarrow \alpha$ but $X \not\mid\!\approx B \rightsquigarrow \alpha$. On-balance reasons provide new rational support; in context $X$, $A$ would defeasibly provide rational support for $B$ that it does not already have.

The theory is, in its basic strategy, an Anderson–Kanger reduction of reason statements to conditionals with a propositional constant in the context of a nonmonotonic logic, treating reasons as granting a kind of strong permission (Anderson 1956, 1958, 1967; Kanger 1957, 1971).

Cicero's Thesis explains how free choice reasons relate to obligations. Cicero (*De Officiis* (I, iii, 8)) defines duties he calls *medium*, or common: "a good (*probabilis*: plausible, credible, justifiable, adequate, or probable) reason can be given for why it was done." Half of this definition—that reasons imply duties—perhaps finds expression in the Ground of Obligation principle, shared by H and ABM. My theory accepts the other direction—*contra* Foot (1978), perhaps, but in keeping with Markovits (2014)—that duties imply reasons.[12] We might interpret this in two ways: that you ought to do something only if you have a good reason to do it—*oughts arise* from reasons—or that *oughts generate* reasons: that obligations are or provide reasons. If you ought to do something, you thereby have a good reason to do it.

The final two theses concern the analysis of reason statements themselves. What is it for one thing to be reason for another? Understanding that requires distinguishing *pro tanto* from on-balance reasons. It also requires recalling a feature of nonmonotonic inference involving reasons. We begin with generalizations or defaults, expressing *pro tanto* reasons. We try to infer, defeasibly, what ought to be done or what reasons, on balance, there are for acting given the situation as described by the premises. Reason statements in the premises of nonmonotonic inferences generally express *pro tanto* reasons, while reason statements in the conclusion typically express on-balance reasons. That is why there is a contrast between (10) and (11) above, and why there might be a difference in intuitions about (11); my promise may be a *pro tanto* reason to give you Blackie but not an on-balance reason to do so.

For *pro tanto* reasons, I therefore adopt the strategy of thinking of reason statements as defaults or defeasible conditionals that H and ABM share, analyzing *That A is a*

[12] It might seem more faithful to Cicero's words to interpret him as saying something higher-order, familiar from Chisholm (1964), and interestingly elaborated in Rett (2016): If $OA$, then, for some $B$, $B$ and $B$ is a reason for $A$. On (41d), this becomes, if $OA$, then there is some $B$ such that $B$ and $B \mid\!\approx A \rightsquigarrow \alpha$. But then, provided that $OA, B \mid\!\approx A \rightsquigarrow \alpha$, $OA$ defeasibly implies $A \rightsquigarrow \alpha$. Presumably, if $B$ is a reason for $A$, it doesn't undermine $A$'s being a duty. Cutting out the intermediate step thus allows us to avoid higher-order quantification without any cost. I set aside here, incidentally, issues concerning the connection between reasons and motivational states. (See, e.g., Manne 2014).

*pro tanto reason for* $B$ as $A \leadsto (B \leadsto \alpha)$: if $A$, then, other things equal, $B$ would have rational support.[13]

For on-balance reasons, think of reasons as justifying a course of action by being specified by a premise from which we can conclude, defeasibly, something we could not conclude before: that the course of action is reasonable. I thus analyze *That* $A$ *is a reason for* $B$, given $X$, as $X, A \mathrel{|\!\!\approx} (B \leadsto \alpha)$ and $X \not\mathrel{|\!\!\approx} B \leadsto \alpha$.

There are important differences between (41c) and (41d), due to the failure of the generalized deduction theorem in nonmonotonic logics (Koons 2014). Consider the circumstances under which they might diverge. One direction is unsurprising: *Pro tanto* reasons are not necessarily on-balance reasons, for they can be undermined, overridden, or disabled (Dancy 2004). A *pro tanto* reason is a reason to do something, *other things equal*, in two senses: (a) if other things are not equal, perhaps one ought not to do that, or at least it may not be the case that one ought to do that; and (b) if other things are not equal, that reason may not, on balance, be a reason at all. Suppose in context $X$ that $A$ is a *pro tanto* reason for $B$: $X \mathrel{|\!\!\approx} A \leadsto (B \leadsto \alpha)$. It does not follow that it is an on-balance reason ($X, A \mathrel{|\!\!\approx} B \leadsto \alpha$), for $X$ could contain both $C$ and $(A \wedge C) \leadsto \neg(B \leadsto \alpha)$. This is just to say that, thanks to Specificity, additional information could lead us to refrain from concluding $B \leadsto \alpha$. $A$ might in general be a *pro tanto* reason for $B$, but whether $A$ functions as a premise in a practical argument concluding that there is on balance reason for $B$ depends on the context.

That on-balance reasons are not necessarily *pro tanto* reasons is perhaps more surprising. Suppose that, in context $X$, $A$ is an on-balance reason for $B$: $X, A \mathrel{|\!\!\approx} B \leadsto \alpha$. Thanks to Diamond and Specificity, it does not follow that $X \mathrel{|\!\!\approx} A \leadsto (B \leadsto \alpha)$, for $X$ could contain $A \leadsto \neg(B \leadsto \alpha)$, $(A \wedge C) \leadsto (B \leadsto \alpha)$, and $C$.

## 8 Disjunctive and existential reasons

My theory justifies the principles of disjunctive and existential reasons without facing the Greedy Reasons or Exploding Reasons problems. Treating reasons as permitting free choice in line with (41) solves the puzzles we have been examining in the context of a wide variety of nonmonotonic logics.

(42) *Existential Reasons*: (41) validates the principle of Existential Reasons: The inference $A$ *is a reason for* $\exists x B(x)$*; therefore,* $A$ *is a reason for* $B(a)$ is defeasibly valid, provided that $\forall x B(x)$ is consistent with $A$.

*Proof* Construe the reason statement in the premise as *pro tanto* and the one in the conclusion as on-balance. The inference becomes: $A \leadsto (\exists x B(x) \leadsto \alpha)$; $A$; $\therefore$ $B(a) \leadsto \alpha$. Since $\forall x B(x)$ is consistent with $A$, the premises defeasibly imply $\exists x B(x) \leadsto \alpha$ by Defeasible Detachment. By a rule of passage, $\exists x B(x) \leadsto \alpha \models \forall x(B(x) \leadsto \alpha)$, and $\forall x(B(x) \leadsto \alpha) \models B(a) \leadsto \alpha$. So, by Closure, $A \leadsto (\exists x B(x) \leadsto \alpha), A \mathrel{|\!\!\approx} B(a) \leadsto \alpha$. □

The theory thus explains intuitions about free choice reasons. Start with an obligation allowing choice: $O\exists x F(x)$. (I owe you a horse, for example.) By Cicero's Thesis,

[13] This would again require extending H to include embedded defaults, as in Brewka (1992).

$\exists x F(x) \rightsquigarrow \alpha$. (If I give you a horse, I satisfy reason's demands.) That is equivalent to $\forall x(F(x) \rightsquigarrow \alpha)$ (Each of my horses is such that, if I give it to you, I satisfy reason's demands), which implies $F(a) \rightsquigarrow \alpha$ (If I give you Blackie, I satisfy reason's demands). Thus:

(43) *Defeasibly Distributed Reasons*: $O\exists x F(x) \approx\!\!\!\mid F(a) \rightsquigarrow \alpha$.

*Proof* $O\exists x F(x) \approx\!\!\!\mid \exists x F(x) \rightsquigarrow \alpha$, by Cicero's Thesis. By a rule of passage, $\exists x F(x) \rightsquigarrow \alpha \models \forall x(F(x) \rightsquigarrow \alpha) \models F(a) \rightsquigarrow \alpha$. By Closure, $O\exists x F(x) \approx\!\!\!\mid F(a) \rightsquigarrow \alpha$. □

(44) *Disjunctive Reasons*: (41) validates the principle of Disjunctive Reasons: The inference $A$ *is a reason for* $B_1 \vee \ldots \vee B_n$*; therefore,* $A$ *is a reason for* $B_i$ is defeasibly valid, provided that $B_1 \wedge \ldots \wedge B_n$ is consistent with $A$.

*Proof* On the same strategy for analysis, the argument becomes: $A \rightsquigarrow ((B_1 \vee \ldots \vee B_n) \rightsquigarrow \alpha)$; $A$; $\therefore B_i \rightsquigarrow \alpha$. If $B_1 \wedge \ldots \wedge B_n$ is consistent with $A$, $A \rightsquigarrow ((B_1 \vee \ldots \vee B_n) \rightsquigarrow \alpha)$, $A \approx\!\!\!\mid (B_1 \vee \ldots \vee B_n) \rightsquigarrow \alpha$ by Defeasible Detachment. By Disjunctive Antecedents, $(B_1 \vee \ldots \vee B_n) \rightsquigarrow \alpha \models B_i \rightsquigarrow \alpha$. So, by Closure, $A \rightsquigarrow ((B_1 \vee \ldots \vee B_n) \rightsquigarrow \alpha)$, $A \approx\!\!\!\mid B_i \rightsquigarrow \alpha$. □

The theory thus agrees with common sense on the puzzles we have been discussing. Why should I give you this horse? Because I promised to give you one. Why should the hungry donkey eat from the pile on the left? Because he's hungry. Why should I practice the piano? Because I should develop my talents. Why should you serve on my jury? Because I have a right to a jury trial. Why should I give you this \$1 bill? Because I owe you \$1.

In each case, the argument that I have no reason to give you Blackie, eat from that pile, etc., rests on the thought that I have no *contrastive* reason to do that as opposed to something else that would constitute acting in the way I have reason to act. But my theory rejects the inference. I have no contrastive reason to give you Blackie rather than Tawny, but I do have reason to give you Blackie. The thirsty man has no contrastive reason to drink from the glass on the left as opposed to the one on the right, but he does have reason to drink from that glass. I have no contrastive reason to give you this \$1 bill instead of that one, but I nevertheless have reason to give you this bill.

On the Principle of Defeasibly Distributed Reasons, conclusions are defeasible. I have reason to give you a horse; it need not follow, thanks to Specificity and Diamond, that I have reason to give you my favorite horse, if we add the information that I have many other horses, that others would better fit your needs, and so on.

Inferences concerning conflicting reasons present us with a choice.

(45) a. That I promised you a horse would be (*pro tanto*) reason to give you Blackie. $p \rightsquigarrow (b \rightsquigarrow \alpha)$
b. That my daughter rides Blackie every day would be (*pro tanto*) reason for me not to give you Blackie. $d \rightsquigarrow (\neg b \rightsquigarrow \alpha)$
c. My daughter rides Blackie every day. $d$
d. I promised you a horse. $p$
e. So, I have reason to give you Blackie. $b \rightsquigarrow \alpha$
f. So, I have reason not to give you Blackie. $\neg b \rightsquigarrow \alpha$

Both conclusions follow. Intuitively, that makes sense; my promise is a *pro tanto* reason to give you Blackie, and my daughter's habit is a *pro tanto* reason not to do so. Both options have rational support. Even on balance, these things considered, I have reason to give you Blackie, and also reason not to give you Blackie. In general, there seems to be no inconsistency in

(46) These things considered, there is reason to give you Blackie, and reason not to give you Blackie. $(b \rightsquigarrow \alpha) \wedge (\neg b \rightsquigarrow \alpha)$

(Note: we have not assumed that $A \rightsquigarrow B, \neg A \rightsquigarrow B \mathrel{|\!\approx} B$. Nor do we have $B \mathrel{|\!\approx} A \rightsquigarrow B$. So, (46) does not trivialize the theory; we cannot reach $\alpha$ or $C \rightsquigarrow \alpha$ for arbitrary $C$).

Anyone who does not want contradictory on-balance, these-things-considered reasons can adopt another principle, which would turn (45) into a diamond inference:

(47) *On-Balance Consistency*: $\neg((A \rightsquigarrow \alpha) \wedge (\neg A \rightsquigarrow \alpha))$

That would prevent us, by Diamond, from concluding anything about on-balance reasons in cases of conflicting reasons.

## 9 The greedy reasons problem

We do not want to accept the inferences *That* $A$ *is a reason for* $(B \vee C) \mathrel{|\!\approx}$ *That* $A$ *is a reason for* $B \wedge C$ or *That* $A$ *is a reason for* $\exists x Bx \mathrel{|\!\approx}$ *That* $A$ *is a reason for* $\forall x Bx$. Much less do we want to allow an inference to any arbitrarily selected obligation or reason statement. My theory does not face the Exploding Reasons Problem, for it rejects Weaker Reasons. That $A$ is reason for $B$ does not imply that it is reason for $B \vee C$.

The Greedy Reasons Problem is more difficult. On H and ABM, either I have no reason to do any determinate action that constitutes acting in a way I have reason to act or I have reason to perform every such action. My analysis allows us to infer reasons to perform determinate actions from determinable obligations to act in a certain way, avoiding the first horn of the dilemma. But what about the other? Do I have reason to give you all my horses?

The Principle of Disjunctive Reasons specifies that if there is a reason for $A$ or $B$, there is a reason for $A$ and also a reason for $B$. So, suppose that $A \rightsquigarrow \alpha$ and $B \rightsquigarrow \alpha$. Does it follow that $(A \wedge B) \rightsquigarrow \alpha$?

The path to that consequence would rely on defeasible strengthening of the antecedent.

(48) *Defeasible Strengthening of the Antecedent*: $A \models B,\ B \mathrel{|\!\approx} C \implies A \mathrel{|\!\approx} C$.

$A$ and $B$ each strengthen $A \vee B$. In the quantified case, $\forall x F(x)$ strengthens $\exists x F(x)$. Note that, on this path, we would need either $A \rightsquigarrow \alpha$ or $B \rightsquigarrow \alpha$; we would, surprisingly, not need both to derive $(A \wedge B) \rightsquigarrow \alpha$. That already seems wrong. If the first of these arguments seems questionable, the second seems outrageous:

(49) a. I have reason to give you Blackie.
b. I have reason to give you Tawny.
c. So, I have reason to give you Blackie and Tawny.

(50) a. I have reason to give you Blackie.
b. So, I have reason to give you Blackie and Tawny.

There is an argument that defeasible strengthening of the antecedent holds, however, given what we have assumed about nonmonotonic consequence. The Principle of Disjunctive Reasons is, after all, a limited instance of strengthening of the antecedent. If we can substitute logical equivalents in $\rightsquigarrow$ statements, then $A \rightsquigarrow \alpha \models ((A \wedge B) \vee (A \wedge \neg B)) \rightsquigarrow \alpha$. Given the Principle of Disjunctive Reasons, that defeasibly implies $(A \wedge B) \rightsquigarrow \alpha$. We have not assumed substitution of logical equivalents for $\rightsquigarrow$. So, this argument does not succeed as it stands.

Nonetheless, H, ABM, and most other nonmonotonic formalisms assume substitution of logical equivalents for defaults or defeasible conditionals. That may or may not be appropriate for reasons. Ralph may have reason to keep an eye on the man with the brown hat; does he thereby have reason to keep an eye on the man he has seen at the beach, given that both are Ortcutt (Quine 1956)? Does the student who has reason to calculate $7 + 3$ thereby have reason to calculate 10 (Duží et al. 2010)? These are subtle questions. Having a hyperintensional defeasible conditional may, to some, seem a high price to pay for Disjunctive Reasons. (But see Santorio (forthcoming) for an argument that counterfactuals are hyperintensional.) Insisting on substitution of logical equivalents would present us with several options, which I do not have space to develop fully here.

The first: Reasons persist until they are satisfied. At that point, they are discharged. I may have reason to give you a horse. But once I have given you one, I no longer have a reason to give you another. I *had* a reason to give you a horse, which explains why I gave you the one I did; but I have no reason to give you a horse *now*. The hungry donkey similarly has reason to eat from a pile of hay, but once he has eaten, he no longer has reason to continue eating from other piles. We might think of this in terms of Specificity or index reasons to times (Asher and Bonevac 2005). This option seems plausible in cases of sequential action, such as drinking glasses of water, eating from piles of hay, or practicing the piano. It has less plausibility when the actions are simultaneous. Presumably I could, for example, give you all my horses at once. Many people could show up to serve on my jury. I could hand you all my \$1 bills in one motion. Why are these joint actions not obligatory?

Second, we might elaborate the semantics and pragmatics of reason statements. We typically express reasons using infinitive phrases—I have reason *to give you a horse*, the donkey has reason *to eat*, etc.—which carry an *irrealis* presupposition, that an action of the contemplated type has not yet taken place (Bresnan 1972; Portner 1992, 1997; Givón 1994; Abusch 2004; Ginzburg 2012; Wurmbrand 2014; Krifka 2012, 2016). Once it has taken place, the presupposition no longer holds, and the reason statement is no longer felicitous. (The first option, in contrast, would hold that it is false.) This too seems plausible for sequential actions, but less so for simultaneous ones. We have no explanation for why I am not obliged to give you all my horses.

The third option is to take the singular, *a horse*, seriously. I have reason to give you a horse. So, I have reason to give you Blackie (and not Tawny) or Tawny (and not Blackie). I can no longer conjoin the disjuncts without obtaining contradictions. And we might reasonably take $((b \wedge \neg t) \wedge (t \wedge \neg b)) \rightsquigarrow \alpha$ as deviant due to its inconsistent antecedent, since $((b \wedge \neg t) \wedge (t \wedge \neg b)) \rightsquigarrow \neg\alpha$. So, we might think, strengthening of the antecedent can do no harm, for the conjoined actions are never consistent, and any reason thus generated would be deviant.

This solution might appear to obviate the need for the analysis I have been giving, for it undercuts Reasons for Conjunctions as well as Strengthening of the Antecedent and so solves the Greedy Reasons Probem independently. But there are two problems. First, this may work when there is a clear bound to what I have reason to do—give you one horse, pay you \$1, etc.—but is harder to employ when there is no such definite bound. How many talents do I have reason to develop? How many people should give money to a given charity? We could perhaps assume a minimality constraint specifying that I have no reason to do more than is required, thus overriding what would otherwise be a defeasible implication, even in cases with vague boundaries (Anglberger et al. 2014, 2015). But it is not obvious how to formulate it in a fully general way.

Second, there is a deeper problem. Many choices involve options that are compatible with one another. I might have reason to practice the piano, harpsichord, or organ. By Disjunctive Reasons, I have reason to practice the piano, reason to practice the harpsichord, and reason to practice the organ. I can do any combination of those things. Recognizing that, to block the inference that I have reason to do all three and so ought to do all three, I might isolate eight options—practicing the piano but neither the harpsichord nor the organ, practicing the piano and harpsichord but not the organ, etc., thus frustrating application of strengthening of the antecedent or Reasons for Conjunctions. But a similar strategy will not block Existential Reasons. And it will not block other strengthenings; a reason to practice the piano, harpsichord, or organ will still generate a reason to practice the piano and the bass.

Fourth, we might alter the semantics for natural language disjunctions, as a number of linguists and philosophers have recently suggested for various reasons, including truth-making (Fine 1994, forthcoming), grounding (Fine 2012), interactions with epistemic modals (Alonso-Ovalle 2006; Santorio forthcoming; Cariani 2017), and free choice permission (Zimmermann 2000; Geurts 2005; Aloni 2007; Fusco 2014a, b). The analogy between free choice permission and free choice reasons makes this strategy especially attractive.

The fifth and most radical option, which I would tend to favor, but which I have no space to develop here, would be to deny that $A$ and $(A \wedge B) \vee (A \wedge \neg B)$ are logically equivalent. This would mean abandoning classical logic for an alternative, e.g., many-valued logic (Kleene 1951; Rescher 1968), First Degree Entailment (Anderson and Belnap 1975; Belnap 1977), situation theory (Barwise and Perry 1983; Portner 1992; Aczel et al. 1993; Devlin 2006; Seligman and Moss 2011), or intuitionistic logic (Fine 2014). Many-valued and relevant nonmonotonic logics have attractive features that make them worth developing for other reasons (Ginsberg 1987, 1988; Fitting 1992; Arieli and Avron 1998; Koons 2000). On such theories, $(A \wedge B) \vee (A \wedge \neg B)$ is stronger than $A$, so we could not move from $A \rightsquigarrow \alpha$ to $((A \wedge B) \vee (A \wedge \neg B)) \rightsquigarrow \alpha$ even if we were to grant substitution of logical equivalents. Moving from $A \rightsquigarrow \alpha$ to $((A \wedge B) \vee (A \wedge \neg B)) \rightsquigarrow \alpha$ would itself be a case of strengthening the antecedent; the argument for defeasible strengthening of the antecedent would become circular.

Many classical equivalences would still hold, however, explaining why some substitutions seem legitimate while others do not. In particular, we could still explain, for most of the above options, why *I have reason to give you Blackie or Tawny* is equivalent to *I have reason to give you Tawny or Blackie*, why *I have reason to practice the piano and the harpsichord* is equivalent to *I have reason to practice the harpsichord and the piano*, and why *I have reason to give you neither Blackie nor Tawny* is equivalent to *I have reason not to give you Blackie and not to give you Tawny*.

It is important to note that the arguments in Sects. 4 and 5 above would work just as well in many-valued logic, First Degree Entailment, or situation theory. Moving to those logics would do nothing to save H or ABM.

## 10 Implications for practical reasoning

Suppose we construe reasons to act in line with the theory I have proposed. What becomes of practical reasoning? In particular, (1), Ground of Obligation, no longer holds: $A$, $A$ *is reason for* $B \not\approx OB$. The logic of free choice reasons we are left with may thus seem disappointing, for it provides only a weak link between reasons and obligations. Recall (2). My promise to give you a horse is reason for me to give you a horse. It does seem to imply, defeasibly, that I should give you horse. But compare this argument, with exactly the same form:

(51) a. My daughter would like a horse.
b. That she would like a horse would be reason for me to give her a horse.
c. *So, I ought to give my daughter a horse.

That conclusion does not seem plausible at all, and not only because of background knowledge that horses are expensive and children easy to spoil. That she would like a horse is a reason to give her one, but not a strong enough reason to generate an *ought*, even defeasibly.

Why does (2) seem defeasibly valid, though (51) is not? My explanation is simple. Though neither argument is defeasibly valid, my promise to give you a horse generates an obligation *qua* promise, not *qua* reason. Buridan expresses the relevant principle as "*Omne promissum cadit in suum debitum*" (1977, p. 83)—"Everything promised is something owed"—which grounds the obligation in a promise *qua* promise. Reasons sometimes ground *oughts*, but, taken individually, they do not do so *qua* reasons. They do so by virtue of being promises, harms, benefits, demands of justice, and so on.

If reasons ground *oughts* independently of such moral considerations, they do so collectively, not one-by-one. From information about reasons we can perhaps infer what there is, on balance, these things considered, reason to do. Moving from there to *oughts*, even *oughts* directed at determinables, to act in a certain way, can require weighing alternatives and weighing reasons in a way that goes beyond the bounds of logic (Lord and Maguire 2016). Just as logic cannot tell Buridan's ass what to do, or Buridan's farmer which horse to surrender, it seems plausible that reasoning about reasons typically cannot tell us what we ought to do. That requires a substantive measure of the strength of reasons.[14]

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