Some remarks on the logic of Broome's metanormative theory

(Work in progress)

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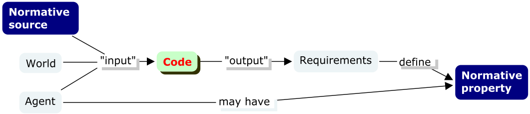
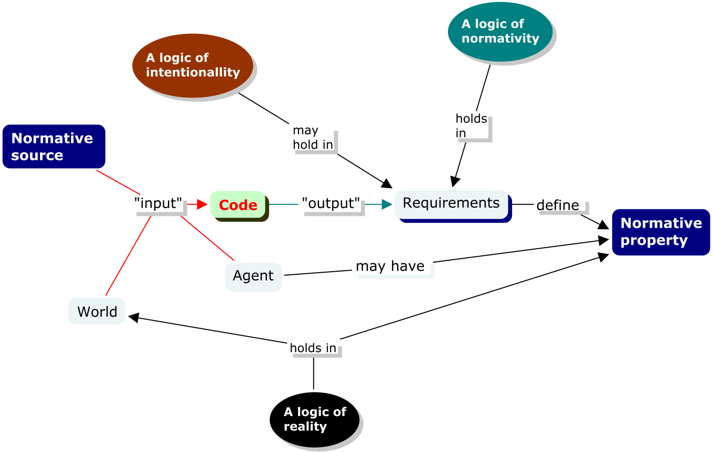
Broome's general approach

- During the last decade John Broome (University of Oxford) has proposed a general approach to the broad philosophical issues of normativity,intentionality, and rationality.
- I will argue that his approach is a promising endeavor, but that also it needs some amendments.
- I will try to do the following:
  1. Give the first order translation and interpretation for Broome's metanormative theory
  2. Introduce new notions using Broome's theory
  3. Propose an improved definition for 'property requirements'.



Which logics do we need?



Code of requirements

Citation

We must allow for the possibility that the requirements you are under depend on your circumstances. Here is how I shall do that formally, using possible worlds semantics. There is a set of worlds, at each of which propositions have a truth value. The values of all propositions at a particular world conform to the axioms of propositional calculus. For each source of requirements S, each person N and each world w, there is a set of propositions $R_S(N, w)$, which is to be interpreted as the set of things that S requires of N at w. Each proposition in the set is a required proposition. The function R_S from N and w to $R_S(N, w)$ I shall call S's *code* of requirements.

John Broome.
Requirements.
In T. Rønnow-Rasmussen, B. Petersson, J. Josefsson, and D. Egonsson, eds., *Homage a Wlodek: Philosophical Papers Dedicated to Wlodek Rabinowicz*, pp. 1–41. Lunds universitet, Lund, 2007.
http://www.fil.lu.se/hommageawlodek

Preliminary steps

- Metanormative theory speaks about a language in which norms are stated.
- Therefore, our starting point is $\mathcal{L}_n$, a language of norms.
- By $\mathcal{L}_n$ I will denote a language of propositional modal logic with the following modalities: $[\mathrm{B}]_i$ for 'i believes that', $[\mathrm{D}]_i$ for 'i desires that', $[\mathrm{I}]_i$ for 'i intends that'.

$$
\begin{aligned}
& I \neq \emptyset,\ i \in I \\
& P ::= \text{ propositional atoms } p, q, r, \ldots \\
& F ::= P \mid \neg F \mid (F \wedge F) \mid [\mathrm{B}]_i F \mid [\mathrm{D}]_i F \mid [\mathrm{I}]_i F
\end{aligned}
$$

The vocabulary

1. Individual constants for normative sources: $s_1, s_2, \ldots, s_n$
2. Function symbols for the code function, the pl-consequence function, the normal logic function : k^3, con^1, l^1
3. Predicates (source, agent, sentence, world, membership, properties): $\mathrm{S}^1, A^1, \mathrm{R}^1, W^1, \in^2, \mathrm{K}^2_{s_1}, \mathrm{K}^2_{s_2}, \ldots, \mathrm{K}^2_{s_n}$
4. Individual variables: $x, y, z, u,\ x_1, x_2, \ldots, x_k, \ldots$
5. Connectives: $\neg, \wedge, \vee, \rightarrow, \leftrightarrow$
6. Quantifiers: $\forall, \exists$
7. Parentheses: (,)

Syntax

1. **Terms.** Individual variables and constants are terms. If $t_1, \ldots, t_n$ are terms and f^n is an n-ary function symbol, then $f(t_1, \ldots, t_n)$ is a term. Nothing else is term.
2. **Atomic formulas.** If $t_1, ..., t_n$ are terms and P^n is a n-ary predicate, then $P(t_1, ..., t_n)$ is an atomic formula in the "metanormative" language $\mathcal{L}_{\mathrm{mn}}$.
3. **Formulas.** Atomic formulas are formulas in $\mathcal{L}_{\mathrm{mn}}$. If v is a variable and if p are q formulas in $\mathcal{L}_{\mathrm{mn}}$, then $\neg p$, $(p \wedge q)$, $(p \vee q)$, $(p \rightarrow q)$, $(p \leftrightarrow q)$, $\forall v\ p$, $\exists v\ p$ are formulas in $\mathcal{L}_{\mathrm{mn}}$. Nothing else is a formula in $\mathcal{L}_{\mathrm{mn}}$. Variable v is bound in $\forall v\ p$ and $\exists v\ p$.
4. **Sentences.** Sentences are formulas with all variables bound.

Models for metanormative language $\mathcal{L}_{\mathrm{mn}}$

Recall!

Definition

Propositional letters are sentences in $\mathcal{L}_{\mathrm{n}}$. If p and q are sentences in $\mathcal{L}_{\mathrm{n}}$, then $\neg p$, $(p \wedge q)$, $(p \vee q)$, $p \rightarrow q$, $p \leftrightarrow q$ are sentences in $\mathcal{L}_{\mathrm{n}}$. If p is a sentence in L_n and $i \in I$, then $[\mathrm{B}]_i p$, $[\mathrm{D}]_i p$, $[\mathrm{I}]_i p$. Nothing else is a sentence in $\mathcal{L}_{\mathrm{n}}$.

Remark

We will need several types of sets in $\mathcal{L}_{\mathrm{n}}$.

- First we will need maximal pl-consistent sets of sentences to model possible worlds. They will be modeled as propositional logic constructs, free of any modality axiom.
- Second, we will need sets of sentences closed under pl-equivalence for (values of the) codes.
- Third, we will need sets of sentences for normal logics of intentionality.

Sets of sets

1. For $x \in \mathcal{L}_\mathrm{n}$, $[x]_\Leftrightarrow = \left\{ y \mid y \in \mathcal{L}_\mathrm{n}, \{x\} \vdash_\mathrm{pl} y \text{ and } \{y\} \vdash_\mathrm{pl} x \right\}$ is a pl-equivalence class for a sentence $x \in \mathcal{L}_\mathrm{n}$.
2. $\mathcal{E}(\mathcal{L}_\mathrm{n}) = \{x \subseteq \mathcal{L}_\mathrm{n} \mid \forall y(y \in x \rightarrow [y]_\Leftrightarrow \subseteq x)\}$ is the set of all sets closed under pl-equivalence (in our model, it is the set of all codes).
3. $\mathit{MaxCon}(\mathcal{L}_\mathrm{n}) = \{x \subseteq \mathcal{L}_\mathrm{n} \mid x \nvdash_\mathrm{pl} \bot, \forall y \in \mathcal{L}_\mathrm{n}(y \notin x \rightarrow x \cup \{y\} \vdash_\mathrm{pl} \bot)\}$ is the set of possible worlds (identified with maximal consistent sets of propositional logic).

Constraints

- Reality without modality!
- In Broome's metanormative theory possible worlds are modeled as propositional logic constructs.
- Worlds are maximal pl-consistent sets of sentences in $\mathcal{L}_\mathrm{n}$:

$$\mathit{MaxCon}(\mathcal{L}_\mathrm{n}) = \{x \subseteq \mathcal{L}_\mathrm{n} \mid x \nvdash_\mathrm{pl} \bot, \forall y \in \mathcal{L}_\mathrm{n}(y \notin x \rightarrow x \cup \{y\} \vdash_\mathrm{pl} \bot)\}$$

- Any kind of failure in the logic of intentionality may occur in a world.
- We keep the world and intentionality apart.

Trouble with axiom T

- The intentionality modalities obeying "reflexive" axiom (T: $\Box p \to p$) should be excluded from the language $\mathcal{L}_{\mathrm{n}}$. E. g. epistemic or praxeological modalities must be excluded.
  - For example, although $[\mathrm{K}]_i p \wedge [\mathrm{K}]_i \neg p$ is a pl-consistent sentence, we do not want to have it any world (unless we allow the awkward possibility that a false proposition may be known as a true proposition).
  - Additional reason for excluding epistemic operator lies in its connection with doxastic one: $[\mathrm{K}]_i p \wedge \neg [\mathrm{B}]_i p$ is a pl-consistent sentence, but we do not want to have it any world (otherwise we would have to allow the awkward possibility that an unbelieved proposition may be known).

Trouble with the "principle of charity"

- In the proposed modeling there is no limit to the amount of irrationality allowed in any world.

Citation

What sets a limit to the amount of irrationality we can make psychological sense of is a purely conceptual or theoretical matter—the fact that mental states and events are the states and events they are by their location in a logical space.

Donald Davidson.
Problems of Rationality.
Clarendon Press, Oxford, 2004.
p. 184

Normal logic of intentionality

Definition

The set of sentences $\mathrm{l}_{ax} \subseteq \mathcal{L}_\mathrm{n}$ is a normal logic for a set $ax \subseteq \mathcal{L}_\mathrm{n}$ of axioms and a set of modal operators $a \subseteq \{[\mathrm{X}]_i \mid \mathrm{X} = \mathrm{B}, \mathrm{D}, \mathrm{I}, i \in \mathrm{A}, [\mathrm{X}]_i$ occurs in $ax\}$ iff

1. l_{ax} contains all tautologies, $\vdash_{\mathrm{pl}} x \Rightarrow x \in \mathrm{l}_{ax}$,
2. it is closed under necessitation rule, $x \in \mathrm{l}_{ax} \Rightarrow [\mathrm{X}]_i x \in \mathrm{l}_{ax}$ for all $[\mathrm{X}]_i \in a$,
3. it is closed under *modus ponens*, $x,\ x \rightarrow y \in \mathrm{l}_{ax} \Rightarrow y \in \mathrm{l}_{ax}$,
4. it is closed under uniform substitution, $x \in \mathrm{l}_{ax} \Rightarrow sub(x) \in \mathrm{l}_{ax}$,
5. it contains K-axioms for all modal operators in a, $[\mathrm{X}]_i(x \rightarrow y) \rightarrow ([\mathrm{X}]_i(x) \rightarrow [\mathrm{X}]_i(y)) \in \mathrm{l}_{ax}$ for all $[\mathrm{X}]_i \in a$,
6. it contains a set ax of axioms for modal operators $[\mathrm{X}]_i$ in a. $Norm(\mathcal{L}_\mathrm{n})$ denotes the set of all normal logics over $\mathcal{L}_\mathrm{n}$.

Definition

$\mathfrak{M}_{mn} = \langle \mathrm{D}, \mathcal{I} \rangle$ is a structure satisfying

Domain $\mathrm{D} = \mathrm{S} \cup \mathrm{A} \cup \mathcal{L}_\mathrm{n} \cup \wp\mathcal{L}_\mathrm{n}$ where

1. $\mathrm{S} \neq \emptyset$, [set of normative sources].
2. $\mathrm{A} \neq \emptyset$, $\mathrm{O} \cap \mathrm{A} = \emptyset$ [set of agents].
3. $\mathcal{L}_\mathrm{n}$ [normative language].
4. $\wp\mathcal{L}_\mathrm{n} = \{x \mid x \subseteq \mathcal{L}_\mathrm{n}\}$

Interpretation

1. $\mathcal{I}(s_i) \in \mathrm{S}$
2. $\mathcal{I}(\mathrm{k})$ is a function: $\mathrm{S} \times \mathrm{A} \times \mathit{MaxCon}(\mathcal{L}_\mathrm{n}) \rightarrow \mathcal{E}(\mathcal{L}_\mathrm{n})$ [following Broome's thesis that codes are closed under equivalence]
3. $\mathcal{I}(\mathrm{l})$ is a function: $\wp\mathcal{L}_\mathrm{n} \rightarrow \mathit{Norm}(\mathcal{L}_\mathrm{n})$ [normal logic]
4. $\mathcal{I}(\mathrm{con})$ is a function: $\wp\mathcal{L}_\mathrm{n} \rightarrow \wp\mathcal{L}_\mathrm{n}$, such that for $x \subseteq \mathcal{L}_\mathrm{n}$, $\mathrm{con}(x) = \{y \in \mathcal{L}_\mathrm{n} \mid x \vdash_{\mathrm{pl}} y\}$
5. $\mathcal{I}(\in) \subseteq \mathcal{L}_\mathrm{n} \times \wp\mathcal{L}_\mathrm{n}$, $\mathcal{I}(S) = \mathrm{S}$, $\mathcal{I}(A) = \mathrm{A}$, $\mathcal{I}(\mathrm{R}) = \mathcal{L}_\mathrm{n}, \mathcal{I}(\mathrm{W}) = \mathit{MaxCon}(\mathcal{L}_\mathrm{n})$
6. $\mathcal{I}(\mathrm{K}_s) \subseteq \mathrm{O} \times \mathit{MaxCon}(\mathcal{L}_\mathrm{n})$

Variable assignment and denotation of terms

- Variable assignment is a function g, possibly partial. For any variable v
  1. $g(v) \in \mathrm{D}$ if $v \in range(q)$
  2. $g_{[x/d]}(v) = \begin{cases} g(v), \text{ if } x \neq v \\ d, \text{ otherwise.} \end{cases}$
  3. $range(g_{\emptyset}) = \emptyset$
- Denotation

$$[\![t]\!]_g^{\mathfrak{M}_{mn}} = \begin{cases} \mathcal{T}(t), \text{ if } t \text{ is an individual constant} \\ g(t), \text{ if } t \text{ is an individual variable} \\ \mathcal{T}(f)([\![t_1]\!]_g^{\mathfrak{M}_{mn}}, \ldots, [\![t_n]\!]_g^{\mathfrak{M}_{mn}}), \text{ if } t \text{ is } f(t_1, ..., t_n) \end{cases}$$

where

$$\mathcal{T}(f)([\![t_1]\!]_g^{\mathfrak{M}_{mn}}, \ldots, [\![t_n]\!]_g^{\mathfrak{M}_{mn}}) = \begin{cases} y, \text{ if } \langle [\![t_1]\!]_g^{\mathfrak{M}_{mn}}, \ldots, [\![t_n]\!]_g^{\mathfrak{M}_{mn}}, y \rangle \in \mathcal{T}(f) \\ \text{undefined, otherwise.} \end{cases}$$

Formulae satisfaction and truth in a model

- Atomic formulae
  1. $\mathfrak{M}_{mn} \models P(t_1, ..., t_n)\ \ [g]$ iff $\langle [\![t_1]\!]_g^{\mathfrak{M}_{mn}}, \ldots, [\![t_n]\!]_g^{\mathfrak{M}_{mn}} \rangle \in \mathcal{T}(P)$
- Molecular formulae
  1. $\mathfrak{M}_{mn} \models \neg p\ \ [g]$ iff not $\mathfrak{M}_{mn} \models p\ \ [g]$
  2. $\mathfrak{M}_{mn} \models (p \wedge q)\ \ [g]$ iff $\mathfrak{M}_{mn} \models p\ \ [g]$ and $\mathfrak{M}_{mn} \models q\ \ [g]$
  3. ...
  4. $\mathfrak{M}_{mn} \models \forall v\, p\ \ [g]$ iff for any $\mathrm{d} \in \mathrm{D}$, $\mathfrak{M}_{mn} \models p\ \ [g_{[v/d]}]$
  5. ...

Definition (Truth in a metanormative model)

Formula p is true in $\mathfrak{M}_{mn}$ iff $g_{\emptyset}$ satisfies p in $\mathfrak{M}_{mn}$:
$\mathfrak{M}_{mn} \models p$ iff $\mathfrak{M}_{mn} \models p\, [g_{\emptyset}]$

Notational conventions

Variable ($k \geq 1$)	Assignment	Informal reading
i_k	$g(i_k) \in \{x \in \mathrm{D} \mid A(x)\}$	an agent
r_k	$g(r_k) \in \{x \in \mathrm{D} \mid \mathrm{R}(x)\}$	a sentence in $\mathcal{L}_\mathrm{n}$
w_k	$g(w_k) \in \{x \in \mathrm{D} \mid \mathrm{W}(x)\}$	a world
$\ulcorner operator(x_1, ..., x_n)\urcorner$	$operator(g(x_1), ..., g(x_n))$	a sentence in $\mathcal{L}_\mathrm{n}$

Example

Instead of

$$\mathrm{R}(x_1) \wedge \mathrm{A}(x_2) \wedge \mathrm{W}(x_3) \wedge x_1 \in \mathrm{k}(s, x_2, x_3)$$

we will write (provided that variables are free for their substituents)

$$r \in \mathrm{k}_s(i, w)$$

Some Broome's metanormative notions

Definition

s -code is pl-**deductively closed** iff

$$\forall i \forall w_1 \forall r (\forall w_2 (\mathrm{k}_s(i, w_1) \subseteq w_2 \rightarrow r \in w_2) \rightarrow r \in \mathrm{k}_s(i, w_1))$$

iff

$$\forall i \forall w \mathrm{k}_s(i, w) = \mathrm{con}(\mathrm{k}_s(i, w))$$

Definition

s -code is **closed under** pl-**equivalence** iff

$$\forall i \forall w \forall r_1 \forall r_2 (r_2 \in [r_1]_{\Leftrightarrow} \rightarrow (r_1 \in \mathrm{k}_s(i, w) \rightarrow r_2 \in \mathrm{k}_s(i, w)))$$

Remark

Note that
$\mathfrak{M}_{mn} \models \forall s \forall i \forall w \forall r_1 \forall r_2 (r_2 \in [r_1]_{\Leftrightarrow} \rightarrow (r_1 \in \mathrm{k}_s(i, w) \rightarrow r_2 \in \mathrm{k}_s(i, w)))$

Definition

s-code is pl-**consistent** iff

$$\forall i \forall w_1 \exists w_2 \; \mathrm{k}_s(i, w_1) \subseteq w_2$$

Introducing new metanormative notions

Definition

s -code is **trivial** iff

$$\forall i \forall w \ \mathrm{k}_s(i, w) = \emptyset$$

Definition

s -code is **impersonal** iff

$$\forall i \forall j \forall w \ \mathrm{k}_s(i, w) = \mathrm{k}_s(j, w)$$

Introducing new metanormative notions

Definition

s -code is **absolute** iff

$$\underbrace{\forall i \forall w_1 \forall w_2 \; \mathrm{k}_s(i, w_1) = \mathrm{k}_s(i, w_2)}_{\text{independent of circumstances}} \wedge \underbrace{\forall i \forall j \forall w \; \mathrm{k}_s(i, w) = \mathrm{k}_s(j, w)}_{\text{equal for any agent}}$$

Introducing new metanormative notions

Definition

Codes with sources s_1 and s_2 are **compatible** for an agent i iff

$$\forall w_1 \exists w_2\, \mathrm{k}_{s_1}(i, w_1) \cup \mathrm{k}_{s_2}(i, w_1) \subseteq w_2$$

Definition

Codes with sources s_1 and s_2 are **socially compatible**

$$\forall i_1 \forall i_2 \forall w_1 \exists w_2\, \mathrm{k}_{s_1}(i_1, w_1) \cup \mathrm{k}_{s_2}(i_2, w_1) \subseteq w_2$$

Using new notions

By introducing new notions new questions may appear. For example, dose rationality as a normative source has some peculiar properties?

Definition

Nontrivial *s*-code is **maximally compatible** iff it is compatible with any consistent code.

Problem

Is the "code of rationality" maximally compatible?

Introducing new notions

Definition

s-code is **achievable** for an agent i iff

$$\exists w \; \mathrm{k}_s(i, w) \subseteq w$$

Definition

Codes with sources s_1 and s_2 are **unachievable** for i in w iff

$$\neg(\mathrm{k}_{s_1}(i, w) \subseteq w \wedge \mathrm{k}_{s_2}(i, w) \subseteq w)$$

Introducing new notions

Definition

s-code is **essential** iff

$$\underbrace{\exists r \forall i \forall w \;\; r \in \mathrm{k}_s(i, w)}_{\text{There is an universal requirement.}}$$

Corrolary

Absolute codes are essential.

Introducing new notions: logic and requirements

- Special case for logic of requirements arises when the code value includes a normal logic:

$$\mathrm{l} \subseteq \mathrm{k}_s(i, w)$$

Definition

An s-code is **logical** iff

$$\exists r_1 \ldots \exists r_n \forall w \forall i \; \mathrm{l}_{\{r_1, \ldots, r_n\}} = \mathrm{k}_s(i, w)$$

- We may distinguish two types of logical properties that a code may have.
  1. External properties of code (like pl-deductive closure, compatibility etc.).
  2. Internal properties, inherited from the logic of the code content. (E.g. if code is logical, then it is pl-deductively closed. The opposite direction needs not hold.)

Broome's solution

Citation

Now we have requirements founded on a code, we can define a property that corresponds to the source of the code. You have this property when you satisfy all the requirements that the source puts you under.
[John Broome, Requirements, 2007.] p.14
In general, P requires of N that p, where P is a property, means that, necessarily, if N has P, then p.
[John Broome, Requirements, 2007.] p.10

Remark

The basic definition of property is a world relative one.

Definition

$\mathrm{K}_s(i, w)$ iff $\mathrm{k}_s(i, w) \subseteq w$

Properties and sources

- If an agent i has a property K_s in w, then $\mathrm{k}_s(i, w)$ is pl-consistent.
- Only achievable codes may define corresponding property.

Fact

The properties corresponding to the unachievable codes cannot be distinguished from each other:

$$(\neg\exists w \mathrm{k}_{s_1}(i, w) \subseteq w \wedge \neg\exists w \mathrm{k}_{s_2}(i, w) \subseteq w) \rightarrow \forall w (\mathrm{K}_{s_1}(i, w) \leftrightarrow \mathrm{K}_{s_2}(i, w))$$

What is wrong with Broome's definition?

Citation

In general, P requires of N [here i] that p, where P [here K] is a property, means that, necessarily, if N has P, then p.
[John Broome, Requirements, 2007.] p.10

Definition

The z-property ♣ requires r of i iff

$$\forall w(\mathrm{K}_s(i, w) \rightarrow r \in w)$$

1. According to this definition, any property requires all the tautologies.
2. The definition does not allow property requirements to differ from a world to a world. It thus prevents the "interaction" between the normative and the real, and connection between to two would be a theoretical gain.

Consistency example

Example

Denote by $\mathrm{l}_{[\mathrm{B}]_i(D)}$ normal logic for doxastic operator having D axiom. Let k_s be a "context free" (absolute) code such that $\mathrm{l}_{[\mathrm{B}]_i(D)} \subseteq \mathrm{k}_s(i, w)$ and let $[\mathrm{B}]_i p \in w$. Although normative source s requires of i in w not to have contradictory beliefs, and in particular $\neg([\mathrm{B}]_i p \wedge [\mathrm{B}]_i \neg p) \in \mathrm{k}_s(i, w)$, still s does not require $\neg[\mathrm{B}]_i \neg p$.
But, for any w such that $\mathrm{K}_s(i, w)$ and $[\mathrm{B}]_i p \in w$, it must be the case that $\neg[\mathrm{B}]_i \neg p \in w$. We are tempted to say that in all worlds in which i believes p, i is under the property requirement not to believe $\neg p$ (or i ought not to believe $\neg p$ in those worlds).
Obviously property K_s does not ♣-require $\neg[\mathrm{B}]_i \neg p$ in w.

A solution

Definition

S-property $\checkmark$-requires r of i in w iff

1. $r \notin \mathrm{con}(\emptyset)$,
2. $\exists x(x \subseteq w \wedge r \in \mathrm{con}(\mathrm{k}_s(i,w) \cup x) \wedge \exists v\ x \cup \mathrm{k}_s(i,w) \subseteq v)$,
3. $\neg\exists x(x \subseteq w \wedge r \in \mathrm{con}(x - \mathrm{k}_s(i,w)))$.

- S-property requires r of i in w iff (i) r is not a tautology, (ii) r is a pl-consequence of a consistent set of s-code requirements together with some (non-code) sentences of w, (iii) no set of "non-code" sentences in w implies r.
- To examine: the relation between $\checkmark$-requires and $\clubsuit$-requires w.r.t. modal sentences.

Goble's puzzle

Citation

We might, for example, have a body of law; what the law requires reaches beyond the bare stipulations written in that body to include, one would think, also what those stipulations entail. If the law says there shall be no camping at any time on public streets, it does not seem much of a defense for a camper to plead that the law never said that there should be no camping on the streets on Thursday night.

Lou Goble's objection to Broome's thesis that codes are not in general deductively closed (in an unpublished manuscript)

Citation

You will not be charged under a law that there shall be no camping on the streets on Thursday night because, so far as I can see, there is no such law. The code of law does not include the proposition that you do not camp on the streets on a Thursday night. So long as we hold tight to the source meaning of *requires*, we should not think the law requires you not to camp on the streets on Thursday night.

I think we should not inject the axiom of inheritance.

Broome's reply

A correction and a comment

Citation

$((S$ requires of N that $p) \wedge (p \rightarrow q)$ is logically valid$) \Rightarrow (S$ requires of N that $q)$.

- Inheritance property ("axiom") expressed in $\mathcal{L}_{mn}$:
  $q \in \mathrm{con}(\{p\}) \rightarrow (p \in \mathrm{k}_s(i, w) \rightarrow q \in \mathrm{k}_s(i, w))$
- Note that Broome mistakenly takes that camping on some day in a week entails camping on Thursday. So in Goble's problem we are not dealing with inheritance property. Rather,camping on Thursday analytically implies camping on some day of a week.

Goble's problem

- There are two ways to formalize Goble's problem.
  1. Boolean variant

     $$\text{If } \ulcorner \neg p \urcorner \in \mathrm{k}_s(i, w) \text{ and } \vdash_{pl} (q \rightarrow p),$$
     $$\text{then } \ulcorner \neg q \urcorner \text{ is required ?(by the source or by the property)}$$

  2. Modal variant

     $$\text{If } \ulcorner [\mathrm{X}]_i \neg p \urcorner \in \mathrm{k}_s(i, w) \text{ and } \vdash_{pl} (q \rightarrow p),$$
     $$\text{then } \ulcorner [\mathrm{X}]_i \neg q \urcorner \text{ is required ? (by the source or by the prope}$$

- There are different ways how to retain Broome's theoretical framework and still solve Goble's problem.

Solutions?

- Goble's example is, so to speak, right to left side of congruence rule, "inheritance axiom" its second side.
- We could impose a restriction on some codes, for example legal ones, to be closed under "partial congruence": $p \in \mathrm{con}(\{q\}) \rightarrow (p \in \mathrm{k}_s(i, w) \rightarrow q \in \mathrm{k}_s(i, w))$
- But, according to Broome, we must abandon this type of solution. I do not think he is right for if he were right, then a more strict logic (here modal logic) would be reducible to more permissive one (here propositional logic). On the other hand, if his rejection was intended to reject external property of the code, then we may agree. E.g. weak congruence needs not be a property of code, but a property of the logic of intentionality that it delivers.

Goble's problem

Boolean variant

$\ulcorner\neg p\urcorner \in \mathrm{k}_s(i, w)$, $\vdash_{pl} (q \rightarrow p)$

Is $\neg q$ required? If so, under which conditions?

Source requirements $\ulcorner\neg q\urcorner \in \mathrm{k}_s(i, w)$	Yes, if the code has the following external properties: $\mathrm{k}_s(i, w) = \mathrm{con}(\mathrm{k}_s(i, w))$ $\top \in \mathrm{k}_s(i, w)$	
Property requirements K_s requires $\neg q$	♣-requirement Yes, if: $\mathrm{k}_s(i, w)$ is "context-independent"	✓-requirement Yes.

Goble's problem

Modal variant

$\ulcorner[\mathrm{X}]_i\neg p\urcorner \in \mathrm{k}_s(i, w)$, $\vdash_{pl} (q \rightarrow p)$

Is $[\mathrm{X}]_i\neg q$ required? If so, under which conditions?

Source requirements $\ulcorner[\mathrm{X}]_i\neg q\urcorner \in \mathrm{k}_s(i, w)$	Yes, if code has the following internal properties: $\mathrm{l}_{[\mathrm{X}]_i(K)} \subseteq \mathrm{k}_s(i, w)$	
Property requirements	♣-requirement No.	✓-requirement No.

Interaction example

Let us consider an example of interaction between reality and normativity using distinction between external and internal properties of a code!

Example

$\ulcorner\neg([\mathrm{B}]_i p \wedge [\mathrm{B}]_i \neg p)\urcorner \in \mathrm{k}_s(i, w)$, $\ulcorner[\mathrm{B}]_i p\urcorner \in w$

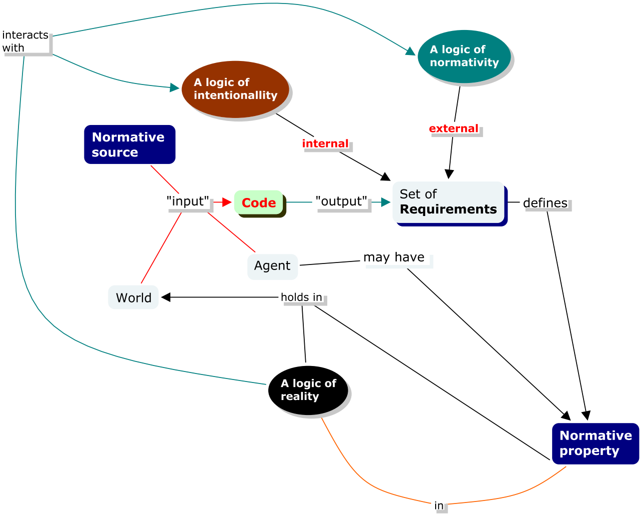
Is $\neg[\mathrm{B}]_i \neg p$ required? If so, under which conditions?

Source requirements	External conditions are not sufficient.	
	Internal property is not sufficient. regardless of $\mathrm{l}_{[\mathrm{B}]_i(\mathrm{D})} \subseteq \mathrm{k}_s(i, w)$	
Property requirements	♣-requirement	✓-requirement
	No.	Yes.

Concluding remarks

- Broome's approach gives a degree of generality needed for "universal logic" perspective.
- His approach seems to be productive. We have tried to show that fact by introducing a number of new metanormative notions.
- His approach needs to be refined in several respects. In particular w.r.t. "property requirements", and, more importantly, w.r.t. distinction between an external logic of a code and an internal logic of the language of intentionality in which some code requirements are stated.
- I claim that by providing a new definition for the "property requirements" and by distinguishing external and internal properties of a code, a new solution for the puzzle of rationalizations (rational explanations) can be given. Rationality as a normative source delivers a logical code, which on the property level interacts with imperfect reality.

Thank you!



interacts with
A logic of normativity
A logic of intentionallity
Normative source
internal
external
"input"
Code
"output"
Set of Requirements
defines
Agent
may have
World
holds in
A logic of reality
Normative property
in