Comments on Calum McNamara's "Bringing About the Good"

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Some Autobiographical Pre-History

Calum's paper makes real progress on a topic I was working on back in the 1990s, got stuck on, and then shelved.

I first spoke about this in a talk I gave at Monash on August 25 1995, entitled "Why 'Causal Decision Theory' is a Misnomer".

Compositional Decision Theory

I proposed in 1995 that we think about CDT not as a *causal* but as a *compositional* decision theory, characterized by the linearity property of general imaging, discovered by Peter Gärdenfors in "Imaging and Conditionalization" (1982).

Compositional: Mixing and Revision Commute

$$\begin{array}{ccc} P, Q & \longrightarrow & \alpha P + (1-\alpha) Q \\ \downarrow & & \downarrow \\ P_A, Q_A & \longrightarrow & \begin{array}{c} \alpha P_A + (1-\alpha) Q_A \\ = \\ [\,\alpha P + (1-\alpha) Q\,]_A \end{array} \end{array}$$

General (i.e. Blurred) Imaging

For each option A and each world v there is a *transfer function* P_A^v, a probability function such that $P_A^v(A) = 1$.

It assigns positive probability only to A-worlds that are closest to v.

We then define:

$$P_A(w) = P(w//A) = \sum_v P(v) \,.\, P_A^v(w)$$

Gärdenfors (1982): Revision is linear (compositional) iff it goes by general imaging.

Gärdenfors's Theorem

Gärdenfors (1982): Revision is linear iff it goes by general imaging.

Credence as a Mixture of Opinionated States

This is the trick behind the proof of Gärdenfors's Theorem.

Any finite probability function P may be written as a mixture of opinionated indicator functions.

$$P(w) = \sum_{v} P(v) \, . \, \chi^{v}(w)$$

$$\text{where } \chi^{v}(w) = \begin{cases} 1 & \text{if } w = v \\ 0 & \text{otherwise} \end{cases}$$

Linearity ⇒ Imaging

$$P(w) = \sum_{v} P(v) \, . \, \chi^{v}(w)$$

So, if the revision method is linear, finitely many iterated applications of the linearity condition yields:

$$P_A(w) = \sum_{v} P(v) \, . \, \chi_A^{v}(w)$$

This is an imaging method.

The transfer function is χ_A^v, the result of revising the indicator function for $\{v\}$ to accept A.

Harsanyi's Principle of Agreement

$$V(< w, i >) = V_i(w)$$

Calum's Reflection Principle

$$P(< X, i >) = P(i) \, . \, P_i(X)$$

and so:

$$P(X) = \sum_{i=1}^{n} P(i) \, . \, P_i(X)$$

All My Possible Future Opinionated Selves

Here's the trick behind the proof of Calum's Theorem.

We may take the finite collection of persons to be all of the observer's possible future opinionated selves. There is one of these people for each world v to which the observer currently assigns positive credence, and her credence function is χ^v.

$$P(w) = \sum_v P(v) \,.\, \chi^v(w)$$

My Value-Constant Future Opinionated Selves

We may avoid any appeal to the Harsanyi Agreement Principle by stipulating that, while becoming opinionated, these future selves do not undergo any changes in what they value intrinsically, i.e. although expected values will have changed under the impact of new information, the value functions V_i over worlds remains fixed:

$$\text{For all } i, w : V_i(w) = V(w)$$

Utilitarian ⇒ Linear

So, if the collection is of all the observer's future opinionated selves, to say that the observer's *EV* is "utilitarian" is to say:

$$EV(A) = \sum_v P(v) \, . \, EV_v(A)$$

Hence $\sum_w P_A(w) \, . \, V(w) = \sum_w \sum_v P(v) \, . \chi_A^v(w) . V(w)$

so $P_A = \sum_v P(v) \, . \chi_A^v$

and the revision of the mixture is the mixture of the revisions. QED.

Conclusion

I like Calum's result a lot, but I'm skeptical that it really has much to do with utilitarianism.

It's Calum's Reflection Principle about credence that is doing the heavy lifting in the proof, not the Harsanyi Agreement Principle.