Coherence and the Role of Specificity: A Response to Meijs and Douven

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Meijs and Douven (2005) present an interesting pair of alleged counter examples and an algorithm to generate such counter-examples to our criterion for a coherence quasi-ordering over information sets as outlined in our 2003a and 2003b accounts. We agree that our criterion does not always provide an ordering when we would intuitively say that one set is more coherent than the other. Nonetheless, we think that our criterion can be salvaged.

We start with a comparison to the literature on the measurement of inequality. The Lorenz dominance criterion yields partial inequality orderings over income distributions (Sen 1997, pp. 48–9). Consider two income distributions. We construct Lorenz curves for both distributions. Now if the Lorenz curve for one distribution is strictly above the curve for the other, then we can say that the former distribution is more equal than the other. But if the curves cross, then nothing can be said about whether one distribution is more or less equal than the other. Now this procedure is very stringent in allocating an ordering. Suppose that one distribution is much less equal than another, but there is some minute respect in which the latter is more equal than the former. For instance, suppose that we a have the distribution <4, 4, 4, 4, 4, 5> and <8, 9, 10, 11, 12, 12>. The former distribution seems clearly more equal than the latter. But due to the fact that there is equality amongst the richest people in the latter distribution that is not present in the former distribution, the Lorenz curves do cross. And hence the Lorenz dominance criterion tells us that no judgement can be passed.

Judgements of inequality are subject to multiple considerations. Now if one distribution is more equal than another in all respects, then the Lorenz dominance criterion will pass judgement. On the other hand, if it is the case that one distribution is more equal than another in almost all respects, but there is one respect in which the latter is indeed more equal than the former, then we may *intuitively* judge that the former is

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more equal than the latter, while the Lorenz dominance criterion may withhold judgement.

We believe that, similar to the Lorenz dominance criterion, our coherence criterion is sensitive to considerations pulling in different directions. Where some considerations are pulling so heavily in one direction that this compels our intuitive judgement, the slightest counterforce from a conflicting consideration can be sufficient for the criterion *not* to impose an ordering. The challenge is to show where this slight counterforce comes from in Meijs-and-Douven like cases.

Notice that the coherence relation is first defined by means of the difference function in equation (20) in Bovens and Hartmann (2003a, p. 613). But we also prove that this definition is equivalent to direct characterizations of the coherence relation in equations (21) and (22) for information pairs. We restate the direct characterization in equation (22) for information *pairs*:

(COH) For two information pairs S and S', $S \succcurlyeq S'$ iff
(i) $a_0 \geq a'_0$ and $a_1 \leq a'_1$, or
(ii) $a_0 \leq a'_0$ and $a_1/a'_1 \leq a_0/a'_0$

Let us express this in words. We take 'weak decreasing' to mean *not increasing* and 'weak increasing' to mean *not decreasing.* Condition (i) states that we can weakly increase the coherence of an information pair by weakly increasing the overlapping area and weakly decreasing the non-overlapping area. Condition (ii) states that we can weakly increase the coherence of an information pair by weakly decreasing the overlapping area as long as we weakly decrease the non-overlapping area to a greater extent.

Thinking about Tokyo-style examples, conditions (i) and (ii) seem very reasonable conditions. Increasing the overlapping area and decreasing the non-overlapping area is conducive to the construction of a more coherent information set. And even if we decrease the overlapping area just a little bit, this decrease can still be offset by a more extensive decrease of the non-overlapping area—this is also conducive to the construction of a more coherent information set. Subsequently, one could extend this reasoning and propose the following conjecture. If we increase the non-overlapping area just a little bit, this increase can still be offset by a more extensive increase of the overlapping area and this is conducive to the construction of a more coherent information set. Or more precisely,

(iii) $a_1 > a'_1$ and $a_0/a'_0 > a_1/a'_1$

However, condition (iii) is neither a necessary nor a sufficient condition for an increase in the coherence of an information set. As a matter of fact, it turns out that if condition (iii) is fulfilled, then there is no coherence ordering over $\{S, S'\}$. Meijs and Douven's examples are precisely of the kind described in (iii). Furthermore, the authors generalize this idea for larger information sets.

So far it seems that we have only made things worse for ourselves. We have given an account of how our criterion systematically yields a certain kind of counter-intuitive result. Can our criterion be salvaged? We propose the following tack. There are various considerations that come into judgements of coherence. There are considerations of *positive relevance* (as measured by the Sjogenji (1999) and the Fitelson (2003) measures) and considerations of *relative overlap* (as measured by the Olsson (2002) measure).[1] In addition, there is also a consideration of *specificity*. In Meijs and Douven's variation of the Tokyo example, we witness a gain in positive relevance and in relative overlap. This prompts our intuition that S is more coherent than S'. However, we will argue that there is also a contrasting consideration, namely, a loss of specificity, which exerts a slight counterforce. Similar to the Lorenz dominance criterion, our criterion is sensitive and it refuses to impose an ordering in the presence of this contrasting consideration.

So let us argue for the importance of specificity in judgements of coherence. We construct the following 100-square Tokyo example. Suppose that in case one, one of the respondents points to squares 21 through 30 and the other respondent points to squares 30 to 39. In case two, one of the respondents points to squares 3 to 82 and the other respondent to square 19 to 98. It would be odd to say unequivocally that the information in the latter case is highly coherent. Certainly there is lots of overlap in the latter case, but then is such overlap not to be expected if the information is so vague, so unspecific? Is the information in the latter case more coherent than in the former case? Again, we would be hesitant to say this. Certainly there is only one overlapping square in the former case, but given the specificity of the information, it is surprising that there is any overlap whatsoever. Bovens and Olsson (2000, p. 689, n. 1) call this aspect of coherence 'striking agreement'. Notice that in both cases, the propositions are independent. The latter information set displays more relative overlap than the former but the former contains more specific information. As a result, our intuitions are pulled in two directions and we withhold from passing a judgement

[1] Note that condition (iii) implies that the relative overlap in S is greater than the relative overlap in S' as measured by the Olsson measure.

of relative coherence. And indeed, our criterion (COH) will not yield an ordering for this case.

We return to Meijs and Douven's Tokyo example in which $a'_0 = 0.01$ and $a'_1 = 0.38$ for S' and $a_0 = 0.26$ and $a_1 = 0.48$ for S. There is an increase in relative overlap and there is a shift from negative to positive relevance as we move from S' to S. This drives our intuition that S is the more coherent information pair. However, there is also an increase in specificity as we move from S to S'. This increase is less outspoken than in the Tokyo example of the previous paragraph, but it is precisely of the same nature. This conflicting consideration is too weak to counteract the relative-overlap and positive-relevance considerations that favour S' over S in our intuitive judgement of coherence, but just as Lorenz dominance may not yield an ordering in the presence of weak conflicting considerations, neither will our coherence criterion.

This reasoning does not hold for inconsistent information sets, i.e. for Meijs and Douven's information sets in which $a_0 = 0$. But our criterion is meant to impose a quasi-ordering on *consistent* information sets. *Nostra culpa*, we should have made this explicit in our article and in *Bayesian Epistemology* (2003b), and our comment about inconsistent information sets in footnote 15 (2003a, p. 260) is misleading. Note however that the exclusion of inconsistent information sets is implicit in equation (18) (2003a, p. 612) since the equations fail to hold for $a_0 = 0$.[2]

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