distributed cognition *in*
collective environmental decision-making

1 *Technocratic Versus Democratic*

Debates over the methods of collective environmental decision-making (CEDM) have been centered by the 'technocratic-democratic' divide. On the *technocratic* side, emphasis is on the *correctness* of environmental decisions in respect of certain criteria of the 'truth'. The high level of complexity and uncertainty of environmental issues provides an *epistemic* reason for specializing decision-making by individuals with sufficiently high competence (experts). On the *democratic* side, emphasis is on the *legitimacy* of environmental decisions in respect of certain *procedural* considerations, such as inclusion, equality and rationality. The extensive coverage of the impact of environmental decisions provides a *procedural* reason for democratizing decision-making by every citizen (laymen). To reconcile the divide, experts and laymen may complement each other, forming a system of **distributed cognition**. This project offers a philosophical foundation of such idea.

2 *Meeting Procedural Requirements*

Suppose Peter, Paul and Mary are making an environmental decision, through majority voting, based on the following inter-connected propositions:

1. "There is pollution in X" (premise, *a*);
2. "If there is pollution in X, then pollution control policy should be introduced in X" (premise, *b*); and
3. "Pollution control policy should be introduced in X" (conclusion, *c*).

	a	*b*	*c*
Peter	✓	✓	✓
Paul	✓	✗	✗
Mary	✗	✓	✗
Majority	✓	✓	✗

Table 1

Table 1 above shows that the collective judgments are inconsistent under the *reasonable* conditions of democracy, namely (1) *inclusion of all consistent inputs*; and (2) *majority voting decision procedure*.

To avoid such irrational outcomes, either condition (1) or (2) must be relaxed. Yet, the procedure will become undemocratic. Alternatively, the collectively judgment on conclusion (*c*) can be decided by focusing solely on either: (i) premises (*a*) and (*b*); or (ii) conclusion (*c*) itself.

> **Claim 1. In CEDM, *if* collective judgments on both conclusion and its supporting reason(s), or premise(s), are expected, such that, say, any collective decisions can be *justified* to future generations, *then* (i) is more desirable.**

3 *Boosting Epistemic Performance*

Then, how may the judgmental power among individuals with different competences be distributed across the *premises,* so as to enhance the chance of making correct decisions? Suppose, for *a*, Peter's competence in being correct is 0.7, while that of Paul and that of Mary are both 0.55. For *b*, the competences are 0.6 for Peter, Paul and Mary. A *distributed-cognitive* system may assign Peter, an expert in judging *a*, to specialize on such proposition while retaining a democratic arrangement on *b*, such that the probabilities of correct judgments on *a* and *b* are both enhanced. **Table 2** compares the performances by different procedures.

Judgmental Power Distribution	*a*	*b*
Peter only on *a* and *b* (technocratic)	**0.7**	0.6
Everyone on *a* and *b* through majority voting (democratic)	0.649	**0.648**
Peter specializing on *a* and everyone on *b* through majority voting (distributed-cognitive)	**0.7**	**0.648**

Table 2

> **Claim 2. In CEDM, *if* collective judgments should track correctness, so as to, say, reflect accurately the interests of future generations, *then* the 'technocratic-democratic' divide can be reconciled by a distributed-cognitive system which allows specialization and democratic arrangement on different premises.**

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