

Supporting Information for

The division of cognitive labor and the structure of interdisciplinary problems

Synthese

2023-05-03

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This document includes the full descriptions of the example value functions in Tables 1 and 2 of the article, and results from an alternative implementation of the simulations in Section 4.

Full value functions for Tables 1 and 2

Table 1: Block-modular value function

Block A	"Value _A "	Block B	"Value _B "	Total value
00	0	00	0	0
00	0	01	1	1
00	0	10	0	0
00	0	11	2	2
01	0	00	0	0
01	0	01	1	1
01	0	10	0	0
01	0	11	2	2
10	0	00	0	0
10	0	01	1	1
10	0	10	0	0
10	0	11	2	2
11	2	00	0	2
11	2	01	1	3
11	2	10	0	2
11	2	11	2	4

Table 2: Nearly modular value function

Block A	Block B	Total value
00	00	0
00	01	0
00	10	1
00	11	0
01	00	0
01	01	0
01	10	1
01	11	0
10	00	1
10	01	1
10	10	2
10	11	0
11	00	0
11	01	0
11	10	3
11	11	4

Results from an alternative implementation of simulations (Section 4)

In the simulations reported in Section 4, we assume a form of coordinative scheduling, where the covers included in a decomposition are applied successively, each application starting from the position reached by a single application of the previous one. For example, a decomposition $\{\{1\}, \{2\}\}$ is applied by first applying the first cover $\{1\}$, and then the second one $\{2\}$, after which the first cover is applied again and so on until (a) simulation time runs out or (b) global maximum is reached.

In order to ascertain that our results do not depend on this particular form of scheduling, we repeated the simulation with an alternative coordination scheme (“1-rep round robin”), where each cover (e.g., $\{1\}$) is applied until no further improvement is not possible (= its local maximum is reached), and only then the application of the next cover begins. As the Figures 1_ALT, 2_ALT and 4_ALT below show, changing this assumption does not qualitatively alter our results. Replicating 3_ALT with respect to this change is not feasible, as it would require a way for agents/disciplines to recognize local maxima, something that is not easily implementable in the current model.

The program code for all the simulations can be downloaded from
https://osf.io/hw7zj/?view_only=b6081af9b43e459c9d47c491c451f380

Figure 1_ALT: Fully modular and non-modular decomposition applied to a fully modular problem (1-rep round robin)

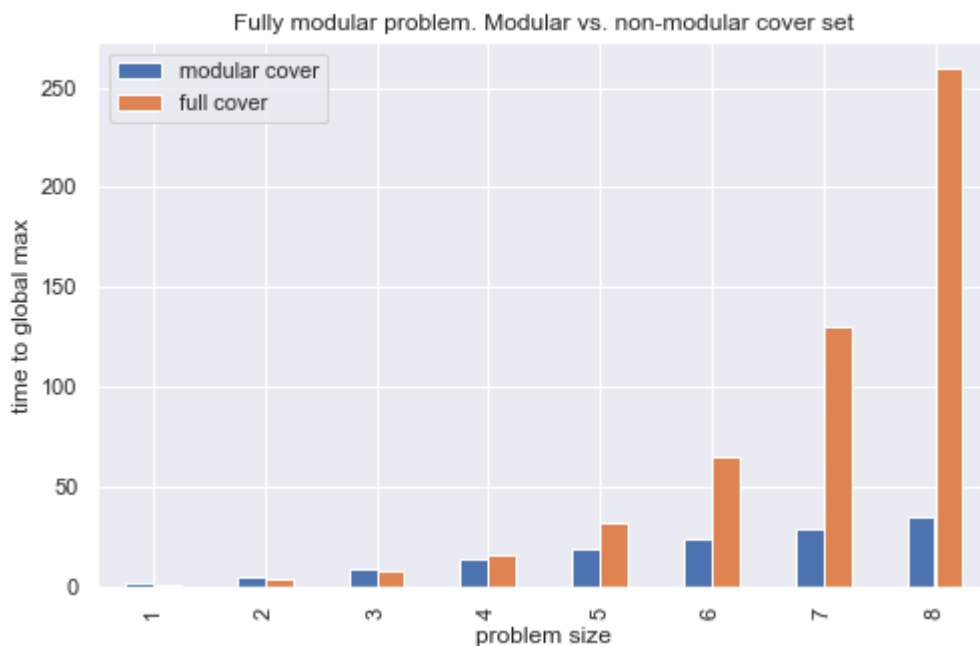


Figure 2_ALT: Fully modular and non-modular decomposition applied to a fully modular problem (1-rep round robin)

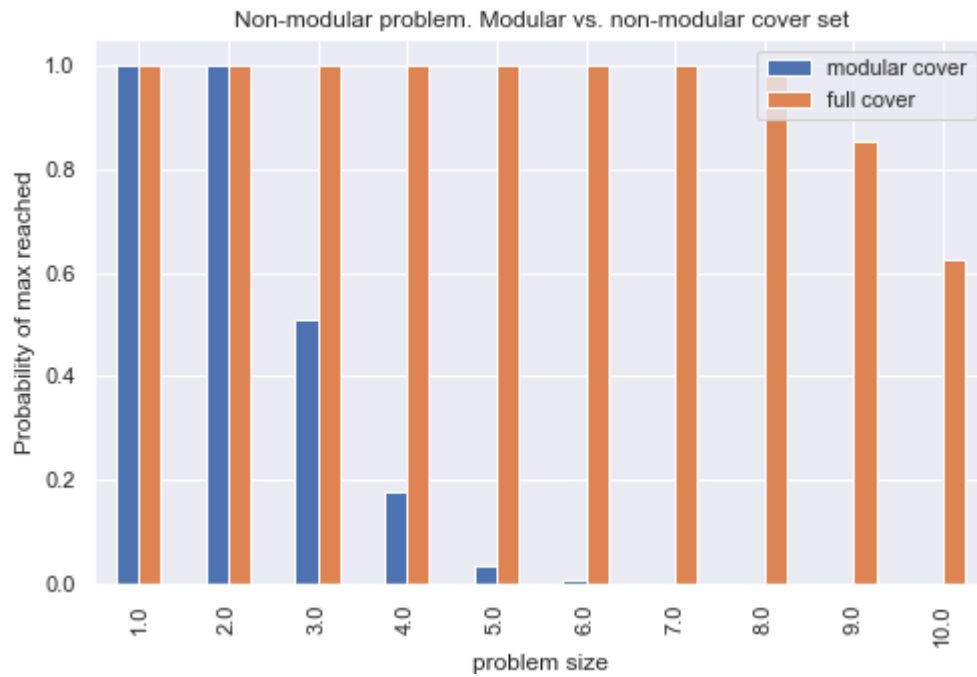


Figure 4_ALT: 6-6 block modular task. Expected epistemic value for different cover sets (1-rep round robin)

