

# **A Short Comment on Rohn, Kalech, & Diskin (2016): Coalition Formation Decision Support System.**

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In a recent publication, we presented an online tool which is able to handle coalition theories based on combined utility functions where ‘combined’ means that they consist of an office and a policy utility term (Graichen et al. 2021). This publication includes a short literature review discussing so far existing coalition tools, one of them being the coalition formation decision support system (CFDSS) by Rohn et al. (2016). We argued that the theoretic foundations of coalition formation in CFDSS are disputable and therefore did not discuss the tool in further detail. We owed an explanation for this statement which we will give in this short note in the following.

CFDSS is based on pairwise policy distances between parties. Each party’s position is reflected by a vector  $y_p = (y_{p1}, \dots, y_{pq})$  in a  $q$ -dimensional policy space. We use different notations here in order to be consistent within the notations by Graichen et al. (2021).

$w_p = (w_{p1}, \dots, w_{pq})$  mirrors a party’s weight of the single policy dimensions, where

$\sum_{j=1}^q w_{pj} = 1$  for all  $p$ . Further, a user who evaluates a coalition weights the importance of the policy dimensions via a vector  $u = (u_1, \dots, u_q)$ . Also,  $\sum_{j=1}^q u_j = 1$ .

According to Rohn et al. (2016, p. 441), “[t]he distance between two parties [1 and 2], given the user’s weight” is  $\sum_{j=1}^q u_j \cdot |w_{1j} \cdot y_{1j} - w_{2j} \cdot y_{2j}|$ . First of all, it does not make much sense that a

distance between two parties depends on a user's weight. But even if we ignore the  $u$  term for the moment, the distance measure does not work in a meaningful way. For example, two parties A and B with exactly the same position in a two-dimensional space but different weights (see Table 1) are assumed to be 0.3 scale points away from each other, when  $u = (0.5, 0.5)$ . Parties C and D, whose positions obviously differ, have zero distance. Since the further modelling is based on this distance function, the whole theory does not make any sense at all.

**Table 1:** An example with four parties

Party $p$	$y_p$	$w_p$
A	(5, 5)	(0.8, 0.2)
B	(5, 5)	(0.5, 0.5)
C	(8, 2)	(0.6, 0.4)
D	(6, 4)	(0.8, 0.2)

### References

- Graichen, R., Linhart, E., Schuster, C., Heller, U. and Müller, A. (2021): Coalizer: A coalition tool combining office and policy motivations of political parties, *Journal of Information Technology & Politics* 18 (Online first).
- Rohn, E., Kalech, M. and Diskin, A. (2016): Coalition Formation Decision Support System, *Social Science Computer Review* 34(4): 437-455.