

## Shifting Coalitions in Games with Preference-ordered Temporal Objectives

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We propose an enhancement of the scope of the setting from [BBMU12] by Bouyer et al. on multiplayer games with classes of  $\omega$ -regular objectives by allowing transitory coalitions. Our study is focussed on the two related classes of safety (invariant) and reachability (aka guarantee) objectives, which are both relatively tractable and the commonest in applications. Within the scope of Concurrent Game Models (CGM), we find this setting, especially with transitory coalitioning taken in account, to be a step forward wrt the established forms of games that are captured by applied systems of logic for strategic ability such as Alternating-time temporal logic (ATL) [AHK02] and Strategy Logic (SL) [MMV10] in their now many variants. The constructs in the basic systems of these well-understood logics are about the strategic ability of permanent coalitions with no reliance on the activities of non-members. Extensions by contexts of strategies (cf. e.g. [GD12] for a review of some systems) can express that some of the players behave in a predictable way. Predictability on the basis of known systems of objectives with preference on them rather than particular known strategies can be viewed as further generalization of this setting too, but with a difference that renders ATL-style syntax inappropriate to adapt any further as this notation exploits the asymmetry between distinguished coalitions and the agents whose behaviour is derived from the context. This is not available with all parties “scheming simultaneously”. Therefore we go for formulating a set of conditions on rational behaviour from first principles as we find it hard to port the results on Nash equilibria investigated in [BBMU12] to a setting of shifting coalitions with temporal

objectives. These conditions provide for enhancing the considered CGMs with a transition relation for the passage of time that represents all the global runs that rational behaviour can possibly produce.

## References

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