Non-self averaging of a two-person game only with positive spillover: A new formulation of Avatamsaka dilemma process.

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We have the Avatamsaka game Aruka [1] as a two-person game only with positive spillovers. In this game, selfishness would not be determined even if the agent selfishly adopted the strategy of defection. Individual selfishness could only be realized if the other agent cooperated. Any same-sized gain can be generated by either defection or cooperation. The sanction by defection as a reaction of the rival agent never then implies the selfishness of the rival. This game can be classified into a dependent game (Akiyama and Aruka [3]).

Aruka [2] gave an idea to formulate an Avatamsaka game process in terms of Polya urn process. If we regarded an evolution of gain-ratio of each agent as a nonlinear function, the dynamics of gain addition could eventually give a limiting expected value. Here, agents shall then initially be motivated by the behaviors of the other agents, and in the event, agents' behavior could be independent from the others.

Now we introduce different spillovers, i.e., indifferent pay-off matrices. Each agent may then be faced with a different pay-off matrix. A ball in the urn is interpreted with reference to an agent’s gain ratio, while a box a pay-off type. We apply Ewensf sampling formula to our urn process under this environment. In this case, we will have a similar result as in the classical case, because we have the averaging on variances of gain-ratios. We then apply Pitmanfs sampling formula to our urn process. Here the invariance of the random partition vectors under the properties of exchangeability and size-biased permutation does not hold in general. Incidentally, Pitmanfs sampling formula depends on the two parameter Poisson-Dirichlet distribution whose special case is just Ewens formula. In Ewens setting, it matters only one probability α on a new entry, on one hand. On the other hand, we can refer to an additional probability θ on an unknown type entry will be argued in the Pitman formula.

More concretely, we will investigate the effects of differing pay-off sizes of playing a series of different games coming out newly. As Aoki and Yoshikawa [4] dealt with a product innovation and a process innovation, they criticized Lucas representative method that Microsoft and small grocery store on the street face micro shocks drawn from the same unchanged probability distribution. In the light of Aoki and Yoshikawa [4], we may show the same argument in our Avatamsaka game with different pay-offs.