An Algorithmic Approach to Group Scheduling

Hooyeon 'Haden' Lee, Yoav Shoham

Group Scheduling Problem

- To find a feasible time slot
  - N invitees
  - M candidate time slots
- Dimensions of Optimality
  - Time: Time to reach agreement
  - Effort: Effort to respond
  - Quality: Quality of schedule

Time-Effort Dimensions

- Batching Scheme, $\{b_i\}$
  - T & E as functions of $\{b_i\}$
  - Time := # of iterations
  - Effort : # of time slots
- Cost = α Time + Effort
  - Min Exp [Cost($\{b_i\}$)]
- In Recursive Form

$C^*(\{b_i\}) = (1 - p(b_1))\, C(\{b_i\} \setminus \{b_1\}) + (\alpha + b_1)$

➔ $C^*(M) = \min\, (1 - p(b_1))\, C(M - b_1) + (\alpha + b_1)$

Efficiency of Doodle

- Critical # of Time Slots for Doodle

S*(N, p)	N = 2	N = 4	N = 6	N = 10
P = .8	**3**	**4**	**5**	**8**
P = .5	**5**	11	22	90
P = .2	14	70	>300	>300

If M > S*(N, p), Doodle is inefficient

- Efficiency of Doodle: C^* / C_D

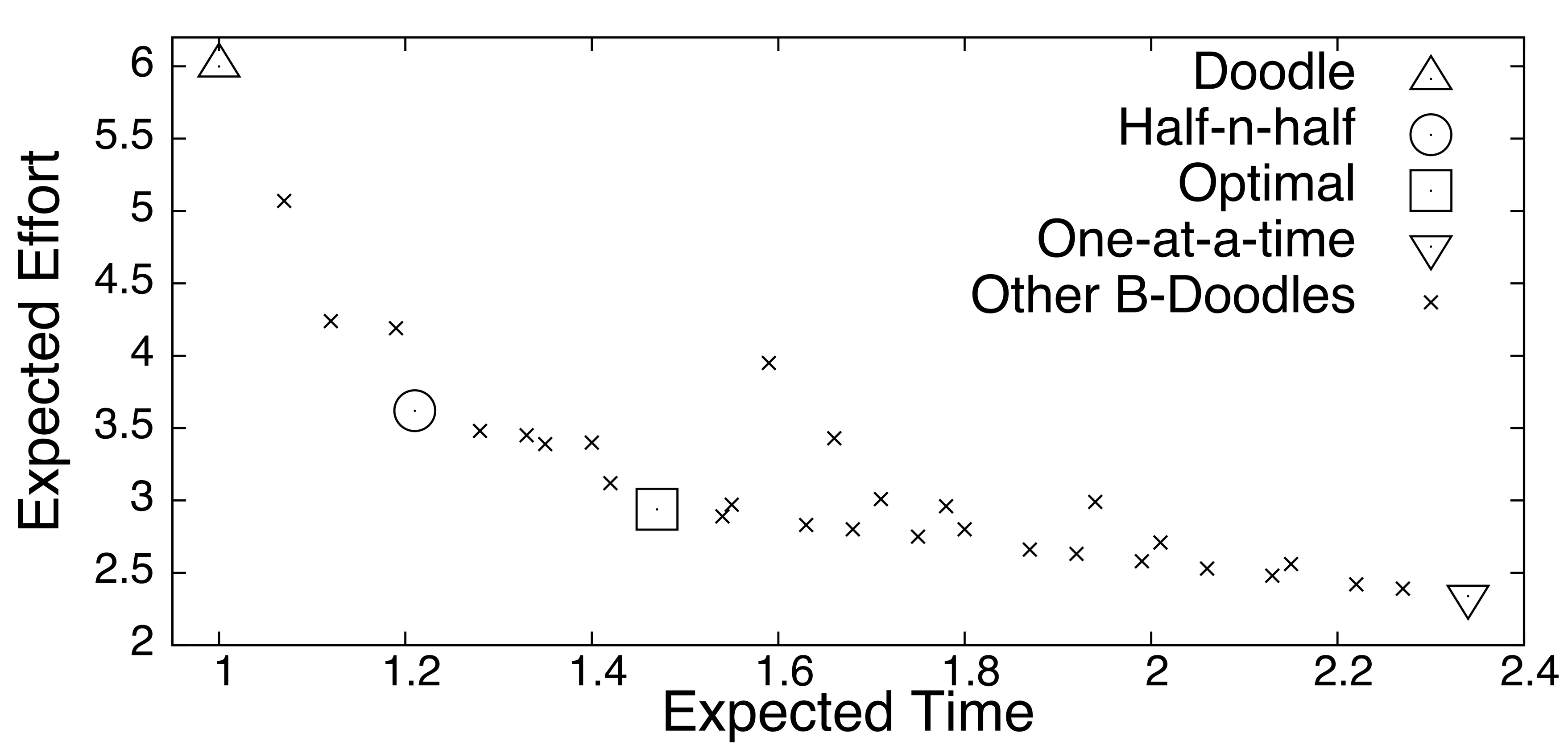
	N = 2	N = 4	N = 6	N = 10
P = .8	**.270**	**.361**	**.486**	.777
P = .5	**.502**	.904	1	1
P = .2	.970	1	1	1

Similar results for non-identical cases

Assumptions and Mechanisms

- Probabilistic Models
  - Availability with p(i, t)
  - [Non-]Identical invitees
  - [Non-]Identical time slots
- Single Proposer Mechanisms
  - Proposer initiates procedure
  - Invitees respond 'Yes/No'

Pareto-Frontier of T-E



Conclusion & Future Work

- Group Scheduling as Optimization
- Pareto Frontier of Time-Effort
- Algorithm for Cost-minimization
- Inefficiency of Doodle
- Future Work
  - Multi Proposer Mechanisms
  - Interplay between Cost and Quality