Collective Intelligence using POGS Tool

Advanced Topics in Artificial Intelligence 2022

Session 08 Tutorial

Outline

- POGS
- Installation
- Platform Interface
- Workflow
- Task Demo

POGS

Platform for Online Group Studies (POGS) is a tool to study collective learning.

- Browser based platform for running group studies that involve synchronous collaboration and interaction
- Design various type of tasks such as
  - Multi-player and coordination games
  - Multiple-choice tests
- Manipulate group communication structures and support group processes with collaboration tools and bots
- Run a set of tasks and collect individual- and group-level data

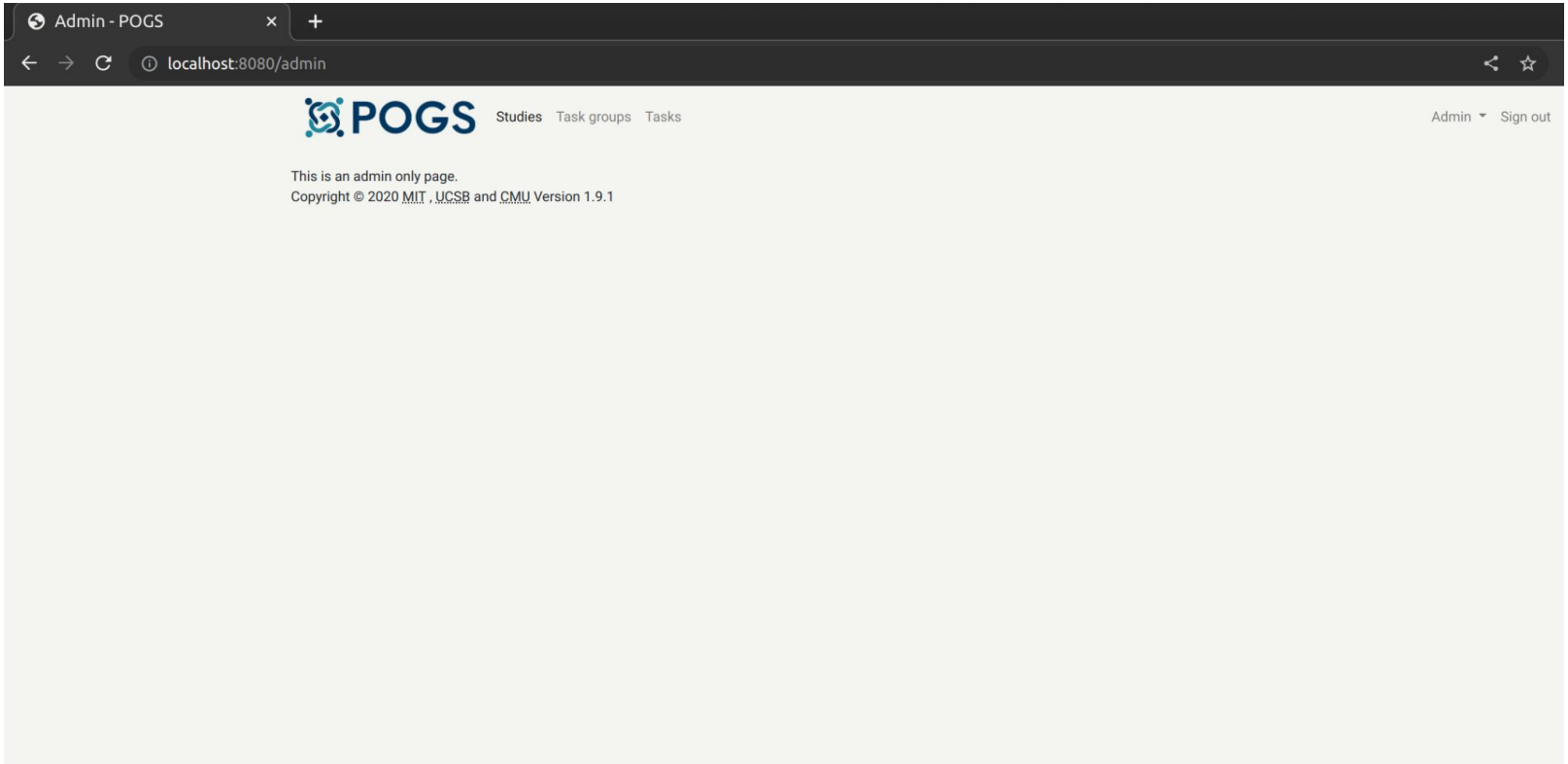
More information can be found in the wiki: https://github.com/CCI-MIT/POGS/wiki/Platform-for-Online-Group-Studies-%28POGS%29-User-Manual

POGS Installation

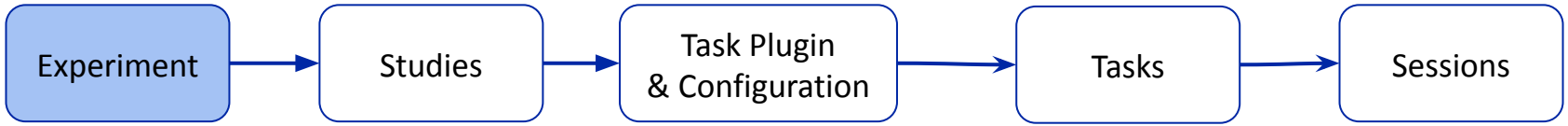
- **Approach 1: Docker based**
  - Install Docker
  - Clone the repository (CCI-MIT/POGS)
  - cp sample.env .env
  - Run at repository root directory:
    - docker image prune
    - docker-compose up
  - Open a browser window at http://localhost:8080/initialize
  - Load the study configuration file
    - Select file: others/T1ShortDemo.zip and click INITIALIZE
  - After confirmation go to: http://localhost:8080/admin
    - Use the following credentials:
      - User: admin@pogs.info
      - Password: pogs1234

- **Approach 2:**
  - Requirements:
    - Java 8
    - mysql-server 5.7
    - nodejs (used for sass) version v9.11.1
  - Refer to the github repository (*https://github.com/CCI-MIT/POGS*)

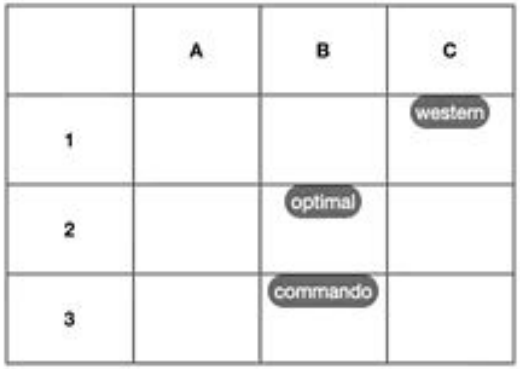
Interface

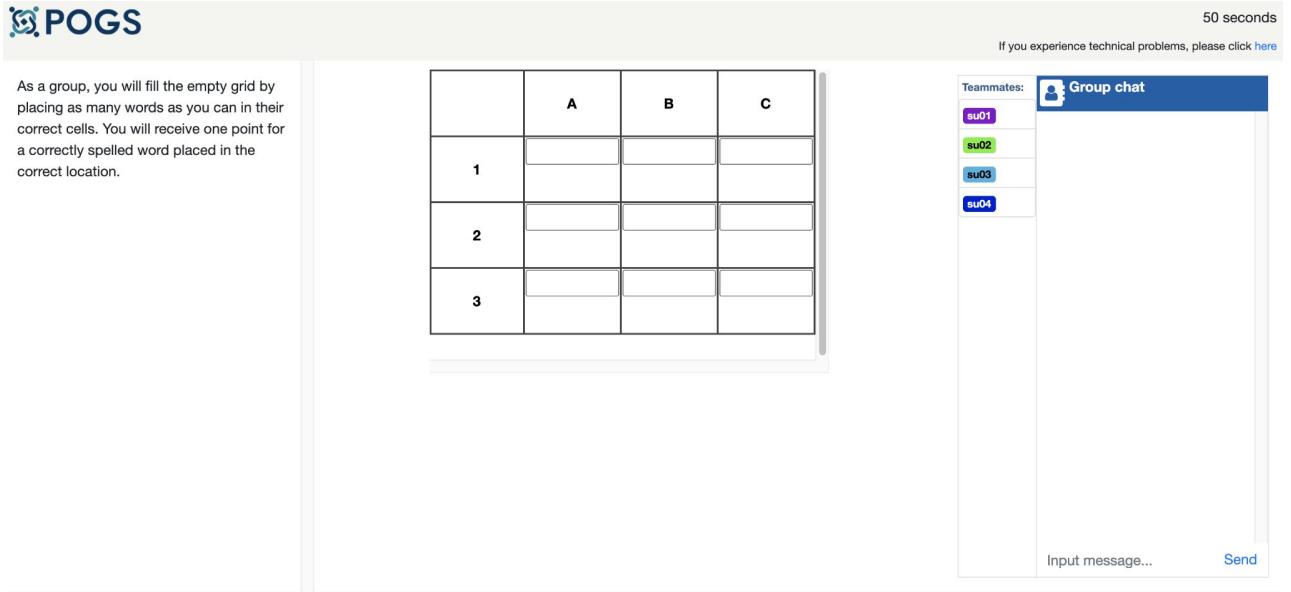

Admin - POGS
localhost:8080/admin
POGS
Studies
Task groups
Tasks
Admin
Sign out
This is an admin only page.
Copyright © 2020 MIT , UCSB and CMU Version 1.9.1

POGS Workflow

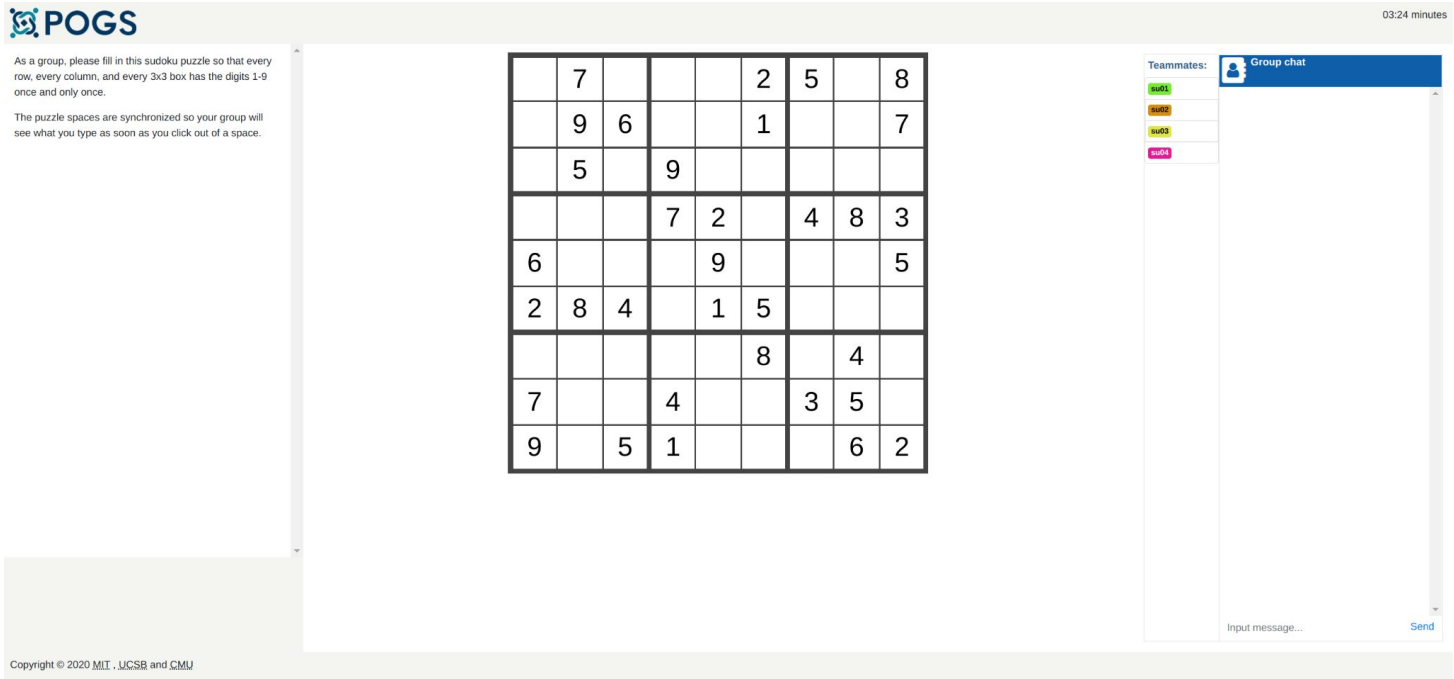


Example Tasks



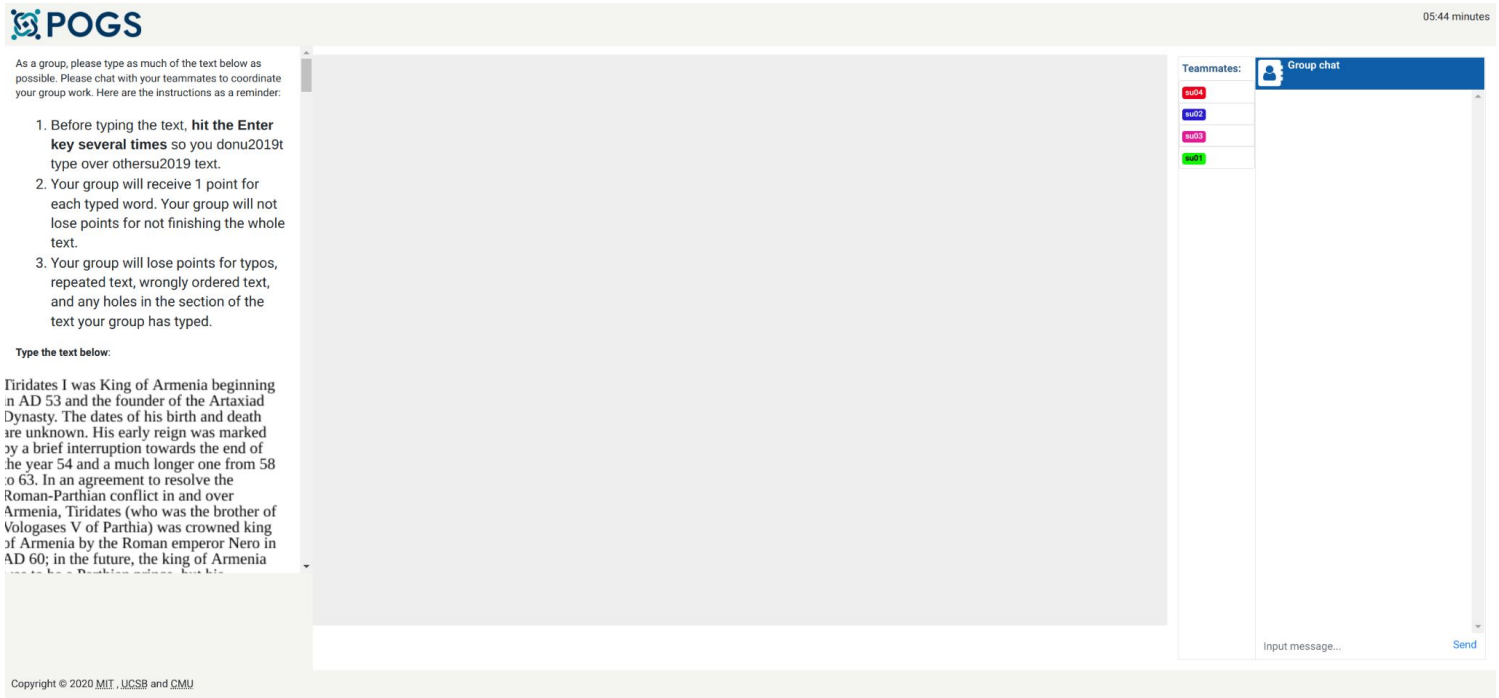


Example Tasks

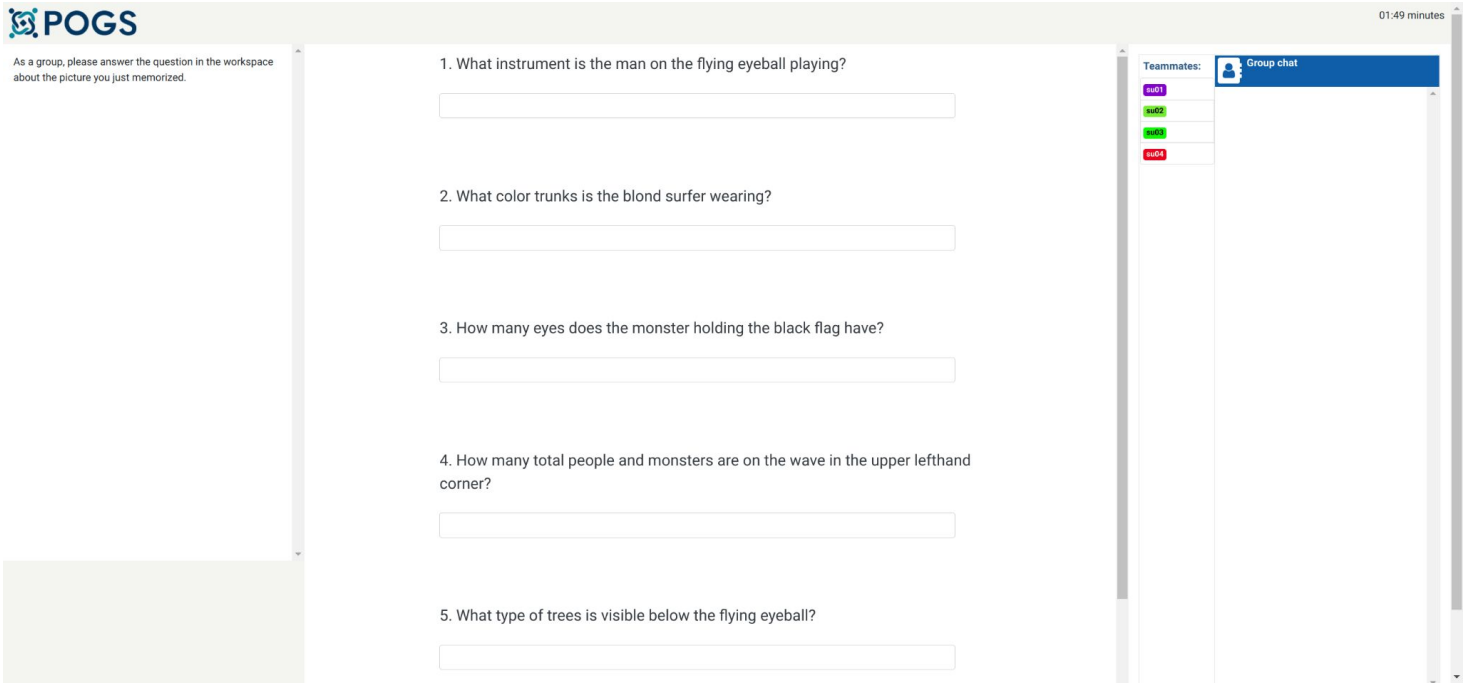


	7				2	5		8
	9	6			1			7
	5		9					
			7	2		4	8	3
6				9				5
2	8	4		1	5			
					8		4	
7			4			3	5	
9		5	1				6	2

Example Tasks



Example Tasks



Performance of human groups

Table 1. Correlations among group tasks and descriptive statistics for Study 1. $n = 40$ groups; $^{*}P \leq 0.05$; $^{**}P \leq 0.001$.

	1	2	3	4	5	6	7	8	9
1 Collective intelligence (*c*)									
2 Brainstorming	0.38*								
3 Group matrix reasoning	0.86**	0.30*							
4 Group moral reasoning	0.42*	0.12	0.27						
5 Plan shopping trip	0.66**	0.21	0.38*	0.18					
6 Group typing	0.80**	0.13	0.50**	0.25*	0.43*				
7 Avg member intelligence	0.19	0.11	0.19	0.12	−0.06	0.22			
8 Max member intelligence	0.27	0.09	0.33*	0.05	−0.04	0.28	0.73**		
9 Video game	0.52*	0.17	0.38*	0.37*	0.39*	0.44*	0.18	0.13	
Minimum	−2.67	9	2	32	−10.80	148	4.00	8.00	26
Maximum	1.56	55	17	81	82.40	1169	12.67	15.67	96
Mean	0	28.33	11.05	57.35	46.92	596.13	8.92	11.67	61.80
SD	1.00	11.36	3.02	10.96	19.64	263.74	1.82	1.69	17.56

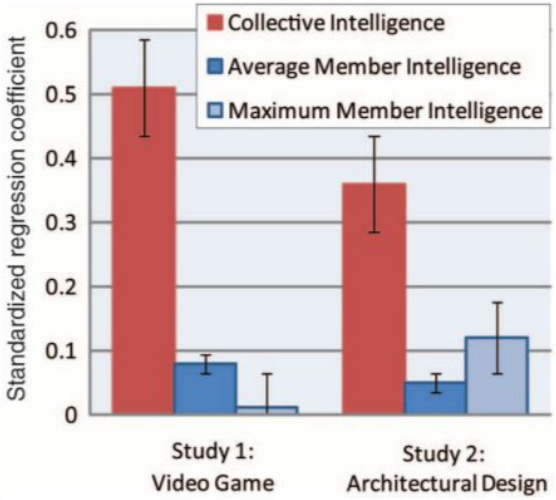
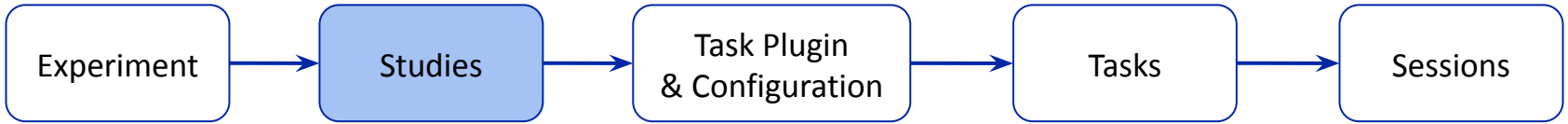


Fig. 1. Standardized regression coefficients for collective intelligence (*c*) and average individual member intelligence when both are regressed together on criterion task performance in Studies 1 and 2 (controlling for group size in Study 2). Coefficient for maximum member intelligence is also shown for comparison, calculated in a separate regression because it is too highly correlated with individual member intelligence to incorporate both in a single analysis ($r = 0.73$ and 0.62 in Studies 1 and 2, respectively). Error bars, mean ± SE.

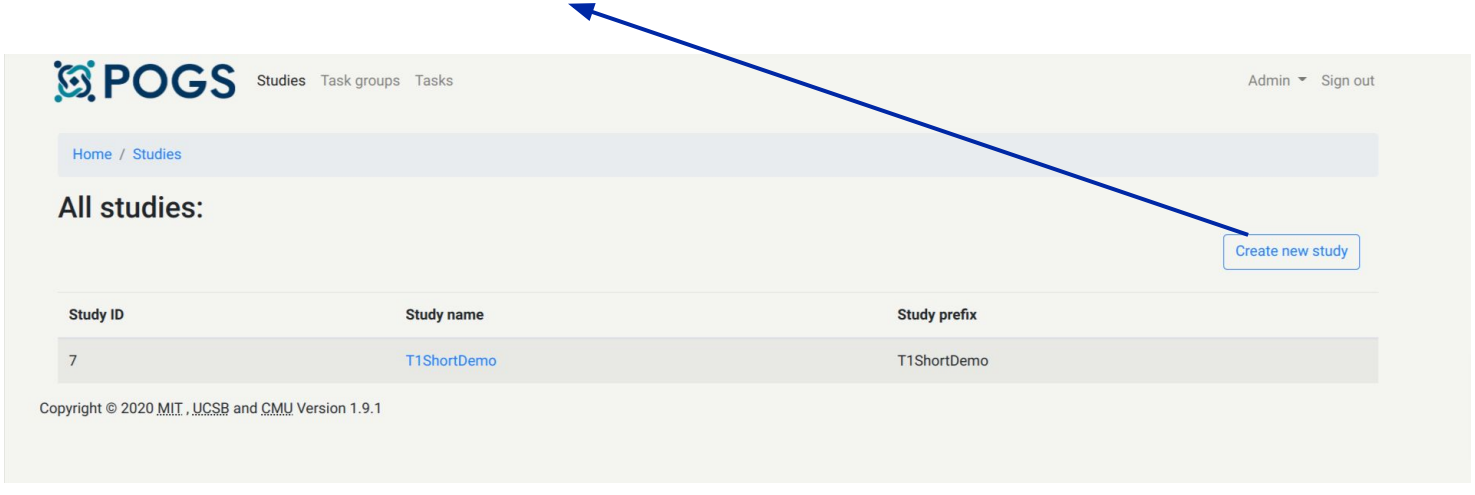
Woolley, Anita Williams, et al. "Evidence for a collective intelligence factor in the performance of human groups." science 330.6004 (2010): 686-688.

POGS Workflow

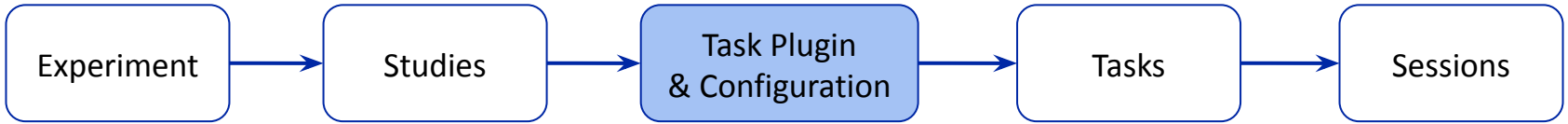


POGS/Studies

- Collection of sessions
- Create separate study for sessions related to the experimental conditions
- Different features of study conditions can be configured at various levels
  - Example, enable or disable text chat in one session
- How to create a new study?

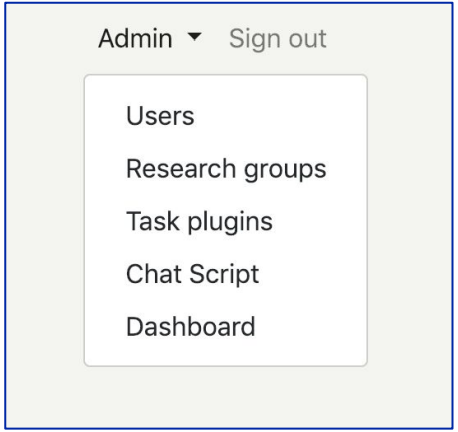


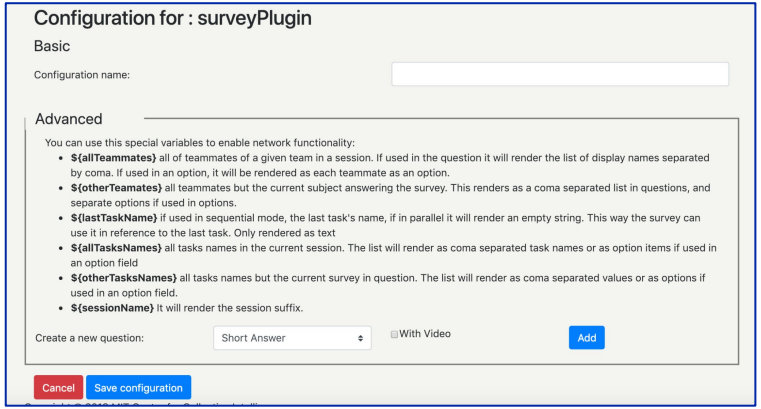
POGS Workflow



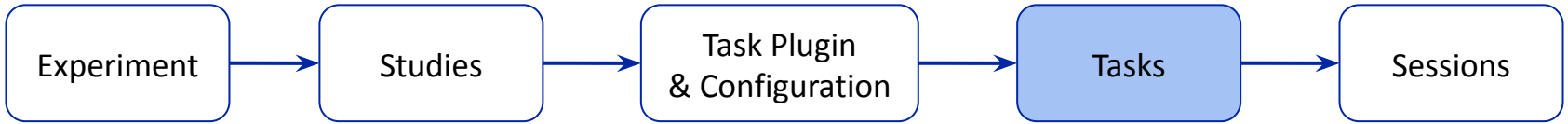
POGS/ADMIN

- Users can be assigned to research groups
- Research group
  - Collection of users
  - Can be assigned to task objects
  - New users can be added to existing research groups
- Task plugins
  - Associated with each POGS Task
  - Several types (example, surveyPlugin)
  - Configuration may be created based on what you want from a task





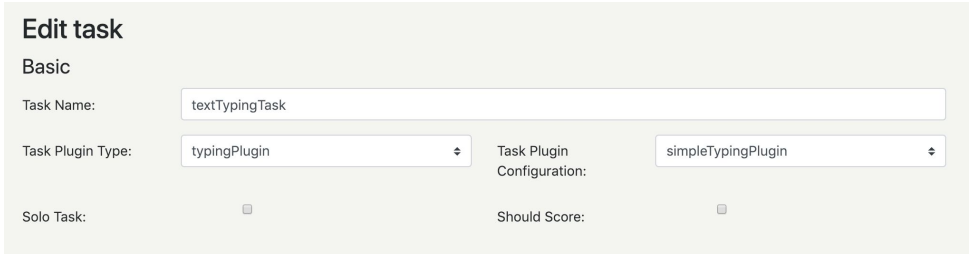
POGS Task Workflow

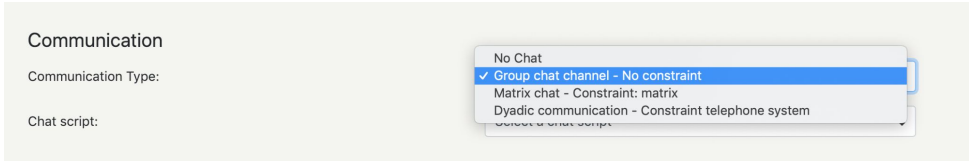


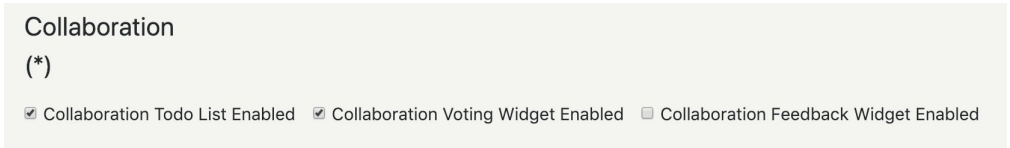
POGS/Task

Task creation

- **Basic configuration**
  - Task name, Task plugin type, Task plugin configuration, Solo task, Should score
- **Pages**
  - Intro page, Primer page, Interaction page
- **Communication**
  - No chat, Group chat with no constraint, matrix chat constraint, dyadic communication constraint
  - Chat script: act as a bot
- **Collaboration**
  - Todo list, voting poll, collaboration feedback widget



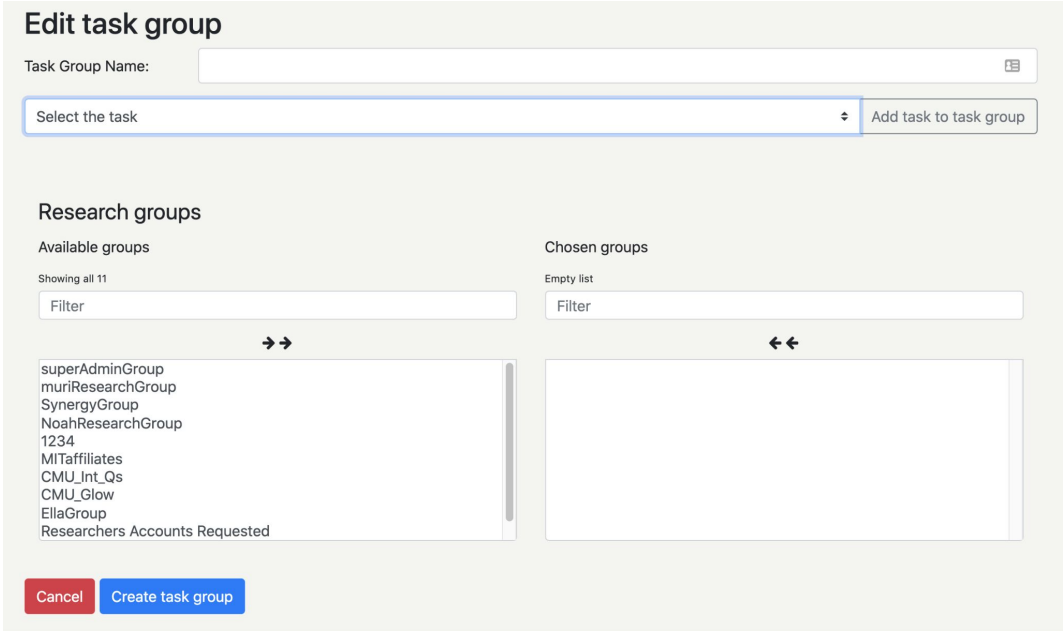




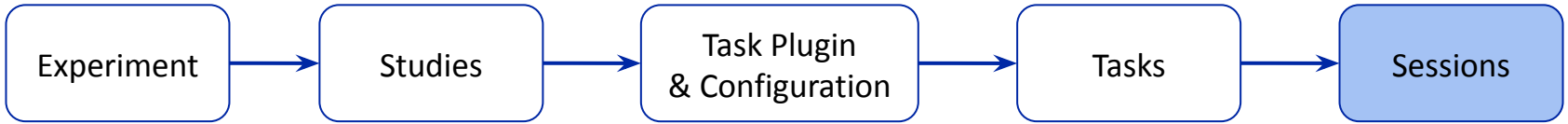
POGS/Task

Task Group

- Tasks must be grouped together to be used in a session
- More details here



POGS Workflow



POGS/Session

- Collection of task groups
- Create a session with
  - Schedule types: for a period of time, or to a specific date
  - Pages: similar to tasks, intro page, …, done page
  - Task execution: sequential fixed, sequential random, parallel
  - Communication and collaboration

Session subject communication:

-	m01	m02	m03	m04
m01	-	☑	☑	☑
m02	☑	-	☑	☑
m03	☑	☑	-	☑
m04	☑	☑	☑	-

POGS/Session

- Create a session with
  - Feedback
  - Team composition: team creation (specific, random, random based on matrix)
  - Task group: associate it with session
  - Subjects:
    - setup subjects,
    - edit communication constraints,
    - create channel (only selected subjects can view and send messages)

Demo

(a) Automated Effort Feedback Nudge

(b) ToDo Tool Nudge

Fig. 1: Sample screen from the Platform for Online Group Studies (POGS); On the top of the interface the (a) automated-effort-feedback; (b) todo-tool is featured.

Source: Gupta, P. R. A. N. A. V., Kim, Y. J., Glikson, E. L. L. A., & Woolley, A. W. (2019). Digitally nudging team processes to enhance collective intelligence. In Proceedings of the 7th ACM Collective Intelligence (CI) Conference. ACM.