Instructional Guide: LEGO® Reproducibility Activity

Acknowledgments: This activity is adapted by the LEGO® Metadata for Reproducibility game pack developed by Mary Donaldson and Matt Mahon. You can view all the original materials from in the folder, original-game-pack.

Goal(s) of the activity

- Explore the information needed for good reproducibility through the medium of LEGO®
- Serve as an icebreaker for groups to interact in smaller groups doing a hands-on activity.
- Prompt a conversation around topics such as Reproducibility; Metadata; Documentation; Collaboration; Data Management Plans

Resources Required

- LEGO® bricks: approximately 15-30 bricks per group
    - There has been a lot of success with using the larger DUPLO® LEGO®
    - Have a variety of bricks and pieces and have this vary within groups
- Worksheets, use the following templates:
    - Laminated double-sided instructions for creating and replicating the build
    - Copy and edit the template
    - Metadata sheet to be printed and written on by participants. Copy and edit the template
- Writing instruments for each group (i.e. pens, pencils, markers)
- Optional: Phone or camera to take pictures of the builds to include in a slide deck to show the original creation build and then the replication build
    - Slide deck to be used for either pictures or discussion or both. Template

Setup

- A single facilitator can likely manage 10 participants (or three groups) on their own, but if there are more participants and therefore more groups, recruit another facilitator
- The activity requires a minimum of two groups to work
- A group can be just one person, but ideally 2-5 people per group
- The original develops suggest a maximum number of participants as 24, as six groups of four
- Have enough space so that participants can spread out to work in their group, and also prevent other groups from seeing the finished creation. If space is limited, preface that groups should focus on their creation and not look at others so that replication can be as blind as possible
- Each group should have:
    - (1) LEGO® set
    - (2) Worksheets: one for instructions and one for metadata
    - (1) Writing instrument
- Pictures for sharing with group
    - One of the facilitators goes around the room and takes pictures of group creations from both rounds.
    - The idea is to create a simple slideshow with the photos to compare originals with recreations.

Timing + Run Through

- Total time for session: 90 minutes

Getting started (5 mins) *Prepare materials as "kits" ahead of time to hand out to groups quickly. Kits include LEGO® set, worksheets (instructions + metadata documentation), and writing instrument*	Brief introduction explaining the activity and distribute participants into groups. Have participants gather in their groups get kits, and then get started
Original Build (40 -45 mins)	Groups follow instructions, create their build, and document their process. Facilitator takes photos of each build for comparison
Transition (2 mins)	Each group disassembles their build into individual pieces again and mixes up the pieces. Have groups flip instructions over to the Replication side and then change locations to build a different groups creation
Replication Build (25-30 mins)	Groups follow metadata documentation left by previous group and replicate that group's build. This should go faster than the first build. Facilitator takes photos of each build for comparison
Transition (3 mins)	Groups clean up and return materials. Facilitator adds photos to slide deck
Discussion (15 mins)	Compare photographs from Original Build and Replication Build. Discuss as a group. See Discussion Questions section

Discussion Questions

- Did you find this a simple way to document your process?
- Was there anything you found difficult to capture?
- Did those replicating the builds find it straightforward to follow?
- Did you encounter any ambiguity in the instructions?
- **NOTE** original game developers have noticed these common themes during discussion:
    - whether block color is a criterion which should be defined
    - ambiguity about the placement or orientation of particular blocks
    - difficulties in deciding how to describe blocks
    - disparities in how different participants interpret the same instructions
    - differences in perception of shape / color

Pedagogy

- This is considered a low-stakes assessment activity because participants are welcome to make mistakes, will give and receive feedback, and get to practice reproducibility without any risk. Aka it's a fun educational activity
- A great activity to use in the beginning of a course or workshop (if multi-days long). It acts as a natural icebreaker, participants collaborate together early on, and gets them excited about the rest of the course or workshop
- Can be used to either warm-up participants' brains about a certain topic or can be used to solidify understanding after a topic has been introduced
- This activity is powerful in that it's simple, yet effective. The instructions and the task are easy to follow, and it allows for participants to connect the activity with the broader topic being taught