

# **ManyBabies 5: Hunter & Ames Model of Infant Attention - Lab Manual**

MB5 Leads

2025-07-08

# Table of contents

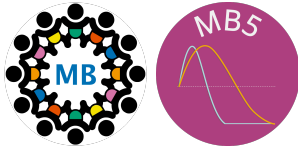
<b>IMPORTANT NOTE!</b>	<b>3</b>
This lab manual is still UNDER DEVELOPMENT! . . .	3
<b>Preface</b>	<b>4</b>
Thank you for contributing to ManyBabies 5, a project of ManyBabies! . . . . .	4
Acknowledgment . . . . .	4
 <b>I   General information</b>	 <b>6</b>
<b>1   Contact info and important links</b>	<b>7</b>
Contact info . . . . .	7
Project listserv . . . . .	7
Important links . . . . .	7
<b>2   Data collection period</b>	<b>9</b>
<b>3   MB5 Lab Participation Overview</b>	<b>10</b>
BEFORE you do ANYTHING else: . . . . .	10
BEFORE you begin data collection: . . . . .	10
Data collection: . . . . .	11
AFTER you finish data collection: . . . . .	11
 <b>II   Getting started</b>	 <b>12</b>
<b>4   Pre-testing steps</b>	<b>13</b>
<b>5   Green-lighting process</b>	<b>14</b>
<b>6   Demographics Questionnaire</b>	<b>15</b>
6.1   Collecting participant information . . . . .	15
6.1.1   Adaptations and translations . . . . .	15
6.2   Uploading demographics questionnaire . . . . .	16

<b>7</b>	<b>Ethics approval</b>	<b>17</b>
7.1	Overview . . . . .	17
7.1.1	All data-collecting labs are required to obtain ethics approval from their local oversight board (e.g., IRB). . . . .	17
7.2	Permission to collect/share demographic data . . . . .	17
	Please make sure you have permission to publicly share anonymized/de-identified raw data (including required demographic info), as this is a condition of participation. . . . .	18
7.3	Permission to share video recordings . . . . .	18
7.4	Uploading ethics approval documentation . . . . .	18
<b>8</b>	<b>Walkthrough Videos</b>	<b>20</b>
8.1	Purpose . . . . .	20
8.2	Method . . . . .	21
8.3	Consent . . . . .	21
8.4	Sequence . . . . .	21
8.4.1	Greeting . . . . .	22
8.4.2	Consenting, instructions . . . . .	22
8.4.3	Questionnaire(s) . . . . .	22
8.4.4	Experiment . . . . .	22
8.4.5	Debrief after experiment . . . . .	23
8.5	Upload your walkthrough video . . . . .	23
8.5.1	Upload your walkthrough video here . . . . .	23
<b>III</b>	<b>Setting up the experiment</b>	<b>24</b>
<b>9</b>	<b>Experiment Overview</b>	<b>25</b>
9.1	Method . . . . .	25
<b>10</b>	<b>Participants and recruitment</b>	<b>26</b>
10.1	Age and sample size . . . . .	26
10.2	Eligibility and Exclusions . . . . .	27
10.3	First-session/second-session policy . . . . .	28
10.4	Peeking and stopping rules . . . . .	28
<b>11</b>	<b>Stimuli</b>	<b>30</b>
11.1	Overview . . . . .	30
11.1.1	ManyFribbuli . . . . .	30
11.1.2	ManyFractals . . . . .	31

11.1.3	Attention-getter stimuli . . . . .	31
<b>12</b>	<b>Procedure</b>	<b>32</b>
12.1	Overview . . . . .	32
12.2	Trial initiation . . . . .	34
12.3	Familiarization Phase . . . . .	34
12.3.1	<i>Infant-Controlled</i> Familiarization . . . . .	34
12.3.2	<i>Fixed-Length</i> Familiarization . . . . .	35
12.4	Test Phase . . . . .	35
<b>13</b>	<b>Apparatus</b>	<b>37</b>
13.1	Equipment . . . . .	37
13.2	Software . . . . .	37
<b>14</b>	<b>Data Validation</b>	<b>39</b>
<b>15</b>	<b>Prior to data collection checklist</b>	<b>40</b>
<b>IV</b>	<b>Running the experiment</b>	<b>42</b>
<b>16</b>	<b>General Lab Practices</b>	<b>43</b>
16.1	Training research assistants . . . . .	43
16.2	Greeting families . . . . .	43
16.3	Compensating families . . . . .	44
<b>17</b>	<b>Testing conditions</b>	<b>45</b>
17.1	Piloting and other non-primary data . . . . .	45
17.1.1	Caregiver bias and instruction . . . . .	45
17.1.2	Collecting participant information . . . . .	46
17.1.3	Experimenter blindness . . . . .	47
17.1.4	Sound volume . . . . .	47
<b>18</b>	<b>During data collection</b>	<b>48</b>
18.1	Restarts, recalibration (eye-tracker) and pauses . . . . .	48
18.2	Exclusions and reporting errors and infant “fuss-outs” . . . . .	48
18.2.1	Session-level and trial-level errors . . . . .	49

<b>V After data collection</b>	<b>53</b>
<b>19 After data collection</b>	<b>54</b>
19.1 Data reporting guidelines . . . . .	54
19.2 Data templates . . . . .	54
19.3 Data dictionary . . . . .	56
19.4 Data Validation . . . . .	56
19.5 Data submission . . . . .	57
19.5.1 Sharing ‘raw’ data . . . . .	57
19.6 Video records of data collection (optional) . . . .	58
<b>Thank you for being part of ManyBabies 5!</b>	<b>59</b>
<b>References</b>	<b>60</b>
<b>Appendices</b>	<b>61</b>
<b>A Collaboration Agreement</b>	<b>61</b>
<b>ManyBabies 5 Collaboration Agreement</b>	<b>62</b>
Conduct . . . . .	62
Anticipated products . . . . .	63
Roles and responsibilities . . . . .	63
A.0.1 Project Leads . . . . .	64
A.0.2 Methodology Team . . . . .	64
A.0.3 Data Collection Teams . . . . .	65
A.0.4 Data Analysis Team . . . . .	66
A.0.5 Writing Team . . . . .	66
Authorship . . . . .	67
Press and public reporting of ManyBabies results . . .	70
Changes to this Collaboration Agreement . . . . .	70
Contact info . . . . .	71

# IMPORTANT NOTE!



---

## This lab manual is still UNDER DEVELOPMENT!

Bear with us as we finalize this document with all of the information your lab will need to successfully collect data for MB5. In the meantime, feel free to poke around and email us at [mb5@manybabies.org](mailto:mb5@manybabies.org) if you have any questions or need help.

---

# Preface

**Thank you for contributing to [ManyBabies 5](#), a project of [ManyBabies](#)!**

MB5 is a cross-lab effort to provide an empirical basis for discussions of replicability as well as cultural, developmental, and methodological variability in infant perception/cognition research. In this project, we are examining drivers of infants' familiarity vs. novelty preference through a collaboratively-designed “best test” of a popular model of infants' visual preference for familiar and novel stimuli ([Hunter & Ames, 1988](#)). More details about the background, design and hypotheses can be found in the [MB5 Stage 1 Registered Report](#) ([Kosie et al., n.d.](#)). In the following sections, we provide instructions for implementing the experiment in your lab and report data back to the project as a whole. Thanks for joining us!

## Acknowledgment

Much of this manual was adapted from the lab manuals created by the MB1, MB2, MB3, and MB4 teams.

---

This is a Quarto book.

To learn more about Quarto books visit <https://quarto.org/docs/books>.

---



Figure 1: Hunter and Ames model of infant attention (adapted from Bergmann and Cristia, 2016)

This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.



## **Part I**

# **General information**

# 1 Contact info and important links

## Contact info

- General inquiries: [mb5@manybabies.org](mailto:mb5@manybabies.org)
- Jessica Kosie (MB5 Project Lead): [jkosie@asu.edu](mailto:jkosie@asu.edu)
- Martin Zettersten (MB5 Project Lead): [mzettersten@ucsd.edu](mailto:mzettersten@ucsd.edu)
- Casey Lew-Williams (MB5 Project Lead): [caseylw@princeton.edu](mailto:caseylw@princeton.edu)
- Heidi Baumgartner (MB Exec. Director & MB5 Coordinator): [heidib@manybabies.org](mailto:heidib@manybabies.org)

## Project listserv

- MB5 project listserv: [mb5-list@manybabies.org](mailto:mb5-list@manybabies.org) *Note: sending an email to this address will send it to everyone subscribed to the MB5 list; please use judiciously!*
  - **SUBSCRIBE** to the [MB5 listserv](#) (click on “Join group” using a google-linked account, or fill out the MB listserv form to request to join)

## Important links

- ManyBabies website: [manybabies.org](http://manybabies.org)
- MB5 project website: [manybabies.org/MB5](http://manybabies.org/MB5)

- **MB5 Stage 1 Registered Report:** [MB5 Stage 1 Registered Report](#)
- **MB5 Lab Manual** (this document): [MB5 Lab Manual](#)
- **MB5 collaboration agreement:** [MB5 Collaboration Agreement](#) (*note: the MB5 collaboration agreement can also be found in the Appendix of this manual*)
- **To report issues (e.g., with data collection, deviations from protocol, etc.) or to request support:** [MB5 Issue Tracking and Support Request Form](#)
- **To upload materials and data** (e.g., ethics approval, questionnaire, data): [MB5 Upload Form](#)

## 2 Data collection period

MB5 data collection is scheduled to run between the following dates:

***Start Date: 2025-MM-DD***

***End Date: 2026-MM-DD***

It is essential that all participating labs do their best to collect data prior to the End Date. However, we understand that there may be disruptions to data collection for various reasons.

**If you are having trouble meeting this deadline, please alert the leadership team ([mb5@manybabies.org](mailto:mb5@manybabies.org)) as soon as possible to discuss options.**

**Labs may join the MB5 project any time during the data collection period, provided:**

- they commit to completing data collection by the specified end date, AND
- a formal “green-light” for testing is obtained from project leadership

## 3 MB5 Lab Participation Overview

These are the steps that every data-collecting lab must follow to participate in MB5. This is just an overview of the process. More detail for each numbered item is available in the linked sections.

### **BEFORE you do ANYTHING else:**

- (1) Complete the [MB5 Sign-Up Form](#).
- (2) Read the MB5 Collaboration Agreement.
- (3) Read this manual start to finish
- (4) Review the information in the ManyBabies General Manual regarding ethical research, authorship, data sharing, and data use.

### **BEFORE you begin data collection:**

- (5) [Set up the experiment](#) in consultation with this lab manual.
  - i) Decide on your planned sample size/stopping rule (see [Participants and recruitment](#)).
  - ii) Carefully record any needed deviations from the protocol using the MB5 issue tracker form.
- (6) Complete the MB5 Laboratory Questionnaire [INSERT LINK],
- (7) Submit your [ethics approval](#), [demographics questionnaire](#), and any other documentation/materials using the MB5 documentation upload form.
- (8) Create and submit your [walkthrough video](#).
- (9) Run pilot sample through the Data Validator.

- (10) Send email to [mb5@manybabies.org](mailto:mb5@manybabies.org) to let the leadership team know that you are ready for “green-lighting”.
- (11) **WAIT for your official “green-light”** from the leadership team to begin data collection.

*IMPORTANT: DO NOT begin data collection (other than piloting) until you have been explicitly (and individually) “green-lighted” to do so.*

### **Data collection:**

- (12) Collect your data!

### **AFTER you finish data collection:**

- (13) Compile your participant and trial data files in consultation with the **Data Reporting Guidelines**.
- (14) Submit your data using the [MB5 data upload form](#).
- (15) Report individual contributions using the [MB Contribution Reporting Form](#)

## **Part II**

# **Getting started**

## 4 Pre-testing steps

This section covers some basic aspects of the project that you'll need to know about BEFORE you set up and run the experiment. Use the arrows to continue to through the sections, or jump to a section using the links below.

- [Green-lighting process](#)
- **Demographics questionnaire**
- **Ethics approval information**
- [Walkthrough videos](#)



## 5 Green-lighting process

All labs must complete a series of preparation steps, referred to by MB as the “**green-lighting**” **process**, before collecting data for any ManyBabies project. These steps are outlined in the MB5 Lab Participation Overview list and in detail throughout the following sections of this manual, but in essence this involves:

- providing **required documentation** (e.g., ethics approval, lab-specific Demographics Questionnaire)
- demonstrating **correct implementation of the testing procedure**
- submitting a **walkthrough video** of the lab’s consent and testing procedure
- successfully running pilot data through the **MB Data Validator**

**IMPORTANT: DO NOT collect experimental data for MB5 until you have received a “green-light” from the MB5 Project Leads!**

## 6 Demographics Questionnaire

### 6.1 Collecting participant information

Please use the MB5 Demographics Questionnaire<sup>1</sup> to collect information about the participant and their family. While parents/guardians can choose to not respond to individual questions, please **check the form BEFORE THE RESPONDANT LEAVES YOUR LAB** to avoid accidental blank responses.

<sup>1</sup> This questionnaire is adapted from the template(s) created by the [MB-Demographics](#) group. Please see Singh et al. (2024) for more information on the development of the template.

#### 6.1.1 Adaptations and translations

As noted in Singh et al. (2024), the questionnaire was developed to query information pertaining to six constructs (biographical information, gestational status, health status, community of descent, caregiving environment, and socioeconomic status). We have added a few additional questions that are of particular interest to MB5 (e.g., family history of colorblindness).

We recognize that the specific questions/response options on the example template (which was developed for use in the United States) are not appropriate for all contexts.

We encourage labs to adapt the questionnaire template as needed, while keeping in mind the goal of querying the same constructs included in the original template to ensure consistency in reporting. For example, the question on race/ethnicity can be adapted to meet the norms of your region. If possible, please use racial/ethnic categories taken from local census categories. For countries where it is not considered socially or legally acceptable to inquire about ethnic background, please adapt to a more appropriate question (e.g. parent and child place of birth), if possible. If you have any questions about

adapting the questionnaire, please contact the leadership team to discuss your concerns. Let us know if any of the questions are unclear to you—it is important that you are able to answer any questions the participants may have. Translations/adaptations of the MB5 Demographics Questionnaire will be available [here](#) as they are created.<sup>2</sup>

<sup>2</sup> Translations/adaptations of the MB-Demographics template are available via the [MB-Demographics OSF repository](#).

## 6.2 Uploading demographics questionnaire

**All labs must upload a blank copy of the Demographics Questionnaire they will be using for MB5 via the [MB5 Upload Form](#) (even if you are using the provided template with no modifications!).**

Please ensure that all uploaded materials are clearly labeled in the filename with your LabID (e.g. `babylabPrinceton_questionnaire.pdf`). Check the list of [LabIDs](#) to confirm your lab's unique LabID before uploading.

## 7 Ethics approval

### 7.1 Overview

#### 7.1.1 All data-collecting labs are required to obtain ethics approval from their local oversight board (e.g., IRB)<sup>3</sup>.

As this process can take time, it is a good idea to **get started on your ethics approval application as soon as possible**. Approvals must be in place and a copy submitted (via the process described below) before you can obtain a green light to collect data. **Contact us** if you need advice or help with obtaining ethics approval.

In some cases, labs will already have approval for MB5 under an “umbrella protocol” (i.e., a protocol that covers multiple studies in one lab). In these cases, the ethics form should still be uploaded as described below.

<sup>3</sup> If your lab/institution does not have a formal ethics oversight board, please refer to [MB's general ethics guidance](#) and contact the Project Leads to confirm ethics compliance

### 7.2 Permission to collect/share demographic data

MB5 (like all ManyBabies projects) asks labs to collect a number of demographic background variables (e.g., gestational age, sex, parental education, community of descent) to be shared along with the main experimental data (after full de-identification is confirmed) (see Chapter 6 for more information). Not all of those variables are part of the main analysis. Even so, it is highly relevant to collect them for describing our sample, for follow-up and secondary analyses, and for checking the representativeness of the sample.

**Please make sure you have permission to publicly share anonymized/de-identified raw data (including required demographic info), as this is a condition of participation.**

[Contact us](#) if your ethics board raises concerns about collecting and/or sharing these data.

## 7.3 Permission to share video recordings

We strongly encourage labs (where possible) to store and share video recordings of their testing sessions on [Databrary](#), which is a secure site created for this purpose. Databrary allows for different levels of privacy: fully private (available only to the uploading research group), shared only with Databrary-approved researchers, or fully open. Storing/sharing videos via Databrary requires the following:

- (16) You will need to ensure that you have **ethics approval** in place to upload and/or share recordings, and
- (17) You will need to **collect specific consent** for this purpose from your participants' parents/guardians.
- (18) You will need to **become a member of Databrary**, which requires approval from your institution, so it's helpful to start this process early. You can [begin the registration process for Databrary here](#).

We are aware that many laboratories, particularly those based in the region governed by GDPR, may not be allowed to use Databrary. In these circumstances we encourage labs to use alternative methods for sharing their videos where possible.

## 7.4 Uploading ethics approval documentation

Ethics documentation (e.g., proof of IRB approval) must be submitted prior to data collection via the [MB5 Upload Form](#).

Please ensure that all uploaded materials are clearly labeled in the filename with your LabID (e.g. `babylabPrinceton_ethics.pdf`). Check the list of [LabIDs](#) to confirm your lab's unique LabID before uploading.

## 8 Walkthrough Videos

Note: These instructions were adapted slightly from the MB1 & MB3 walkthrough instructions

Once the experiment is set up and people involved in data collection are trained, and BEFORE beginning data collection, we ask that you document how you run the MB5 study in your lab by creating a “Walkthrough” video.<sup>4</sup>

**Even if you already provided a video for another ManyBabies project, a new video specifically showing how you run the MB5 project is requested.**

<sup>4</sup> We strongly prefer videos, but if this is not possible for your lab, detailed photographs would be an option.

### 8.1 Purpose

The purpose walkthrough videos is two-fold:

1. Given the ManyBabies Consortium’s commitment to Open Science, we would like to have a full and accurate record of how the study was implemented in each laboratory.
2. One of the goals of ManyBabies is to study how methodological variation affects experimental outcomes in infant research. This video record may be used for analyses examining whether laboratories with different characteristics and procedures (e.g., larger or smaller test booths, white or black walls) differ in the effect size obtained in ManyBabies projects.

Please rest assured that these videos will NOT be used by ManyBabies to critique individual researchers’ laboratory policies and procedures. This project is a community effort!

## 8.2 Method

There are two possibilities to create a video documenting your process:

1. Filming a (preferably pilot) session with a participant (with parental approval and permission from your local ethics board). **Please make sure you have permission to share this video fully publicly!!**
2. Asking a colleague to “play” parent and using a dummy (e.g., a doll) as a baby stand-in.

IF YOUR FINAL VERSION IS NOT READY FOR PRIME TIME, FEAR NOT. The goal is to be informative, not flawless—it can have starts, stops, and disfluency.

## 8.3 Consent

Note that we plan to share the videos among the consortium via Databrary, our website, and/or YouTube. There should be no assumption of privacy, and no confidential or otherwise sensitive information should be included in the videos. Be sure that parental consent covers all these options when filming participants.

## 8.4 Sequence

Make sure your video covers the following components. We added questions you should answer for each step. It is not necessary to narrate your video (you can if you want); a silent observer is sufficient, but be sure to cover all details requested below. If your lab language is not English, we might add subtitles later on.



### **8.4.1 Greeting**

1. Where do you receive families? (Dedicated area, parking lot, general entrance)
2. Who is there? (Parents, colleagues, assistants)
3. What do you say and ask them? (Example: Do you check when the baby last ate/slept?)
4. What do you do if a baby arrives asleep or fussy?

### **8.4.2 Consenting, instructions**

1. What is your informed consenting process like? How do parents give consent? When do you typically obtain consent?
2. How detailed do you explain the procedure and aim of the study?
3. What instructions do you give to the parents? Are there any specific instructions on how to behave, sit, hold the baby, etc?

### **8.4.3 Questionnaire(s)**

1. At what point do you hand out/collect questionnaires (e.g., pre- or post-experiment)?
2. Do you give any additional instructions for the questionnaire other than those listed on the form(s)?

### **8.4.4 Experiment**

1. What does your testing room/booth look like (size, layout, etc.)? Try to film the entrance and complete interior of the test booth or room.
2. Where is the baby sitting (e.g., parent's lap, high chair, etc.)? Film the seating arrangement before the baby is seating and with the baby.
3. What does the stimulus display look like (size, distance to baby)? Where is the screen located?

4. Where is the experimenter located during testing (e.g., inside or outside the booth)? Show where the experimenter is sitting; if it is in the same room, capture both baby and experimenter.
5. Can the baby see the experimenter during testing? How does the experimenter see the baby (e.g., videofeed)?
6. How is the experimenter blinded to trial type during testing?
7. How is the parent blinded during testing (blackout glasses or something similar)?
8. If live-coding takes place: Show examples of what counts as a look/no look and/or videotape someone doing the coding together with the infant looks.

#### 8.4.5 Debrief after experiment

1. What do you tell parents at the end of a study?
2. Are there standard questions you ask them?

### 8.5 Upload your walkthrough video

#### 8.5.1 Upload your walkthrough video here

- Please ensure that your video is clearly labeled in the file name with your **LabID** (e.g. *babylabPrinceton\_walkthrough.mpg*).
- You are welcome to view videos that have already been uploaded by other labs as examples (*note that these videos might not have been reviewed yet by project leads for completeness*)
- Walkthrough videos from MB1 are available on [Databrary](#)

## **Part III**

# **Setting up the experiment**

## 9 Experiment Overview

This chapter explains the experimental procedure in detail. Please follow the instructions as closely as possible, and report any deviations from the protocol using the MB5 issue tracker form.

### 9.1 Method

- [Participants and recruitment](#)
- [Stimuli](#)
- [Procedure](#)
- [Apparatus](#)
- [Data validation](#)

## 10 Participants and recruitment

While we encourage as much participation as you can spare, it is crucial to the success of the project that you treat our study with the same care as you would any other study in your lab with respect to recruitment procedures, timing of data collection, and RAs/RA training. Please do not commit to providing data to ManyBabies if this level of care is not possible.

### 10.1 Age and sample size

The expected lab contribution is a **full sample of 32 babies** (*preferred, if possible*) or a **half sample of 16 babies** (*minimum*).

***Minimum age: 3 months, 0 days***

***Maximum age: 15 months, 0 days***

For example, on a testing date of 2025-04-15, eligible infants would have birthdays on or between 2024-01-15 and 2025-01-15.

You can use an online tool such as this [Age Calculator](#) to use the infant's date of birth and testing date to determine eligibility and calculate age in days, which is the required format for age reporting.

### Notes about age and sample size:

- Try to distribute participants across the full range of ages, if possible.
- A lab's sample size contribution **includes any infant who enters the laboratory**, even if they are eventually excluded (e.g., due to fussiness, experimenter error, too young or too old, etc.).
- In situations where labs plan but are unable to collect the minimum contribution (16 babies), lab members will still be eligible for authorship. Alternative contributions may be requested by the Project Leads in these circumstances.

## 10.2 Eligibility and Exclusions

### The only requirements for inclusion in MB5 are:

- the infant's age falls within the 3- to 15-month age range  
AND
- the infant has no known issues that would directly impede their ability to process visual stimuli

**Infants with other characteristics that are commonly used as exclusion criteria in developmental studies (e.g., hard of hearing, premature, bilingual, etc.) can be included in the sample.**

Please determine participants' eligibility on the phone prior to scheduling them in the ManyBabies study to avoid testing ineligible participants, but note that the inclusion criteria for MB5 are much more inclusive than typical in-lab studies (described above). Participants who come into the lab who are subsequently determined to be ineligible should be still reported in the sample but clearly marked as ineligible based on age or visual processing impairment (see [Data reporting guidelines][Data reporting guidelines] for more info).

### 10.3 First-session/second-session policy

Some laboratories have the practice of testing babies in more than one study during the same visit.

- ***‘First session’*** refers to babies tested soon upon arrival to the lab, prior to participating in any other studies.
- ***‘Second session’*** refers to any testing that is done after the first session.

**Please contribute ‘first session’ babies when possible.**

It is possible that second session babies will contribute worse/weaker/different data with respect to the larger goals of determining effect sizes.

**Label ‘second session’ babies** appropriately if infants were run in a different study on the same visit prior to their participation in MB5. Please also document the nature of the study run prior to MB5 for all ‘second session’ participants (e.g., “7 minute study of object categorization using eye-tracking”).

### 10.4 Peeking and stopping rules

In your initial commitment to a recruitment block (in the laboratory questionnaire), you will document your recruitment practices, your initial plan regarding how many babies you will run and of what type, as well as your stopping rule (e.g. stop when I reach the specified N, stop when the study data collection time ends). It is important to document any changes to your recruitment/stopping rule with a “protocol change form”. **IMPORTANT:** It is critical for the integrity of the data analysis that you NOT base any decisions about how many babies to run on the data being generated in your lab, or on the number of participant exclusions. Laboratories should stick with their original “stopping rule” - whether based on a number of participants or testing time frame. However, we recognize that this may not always be possible. In extraordinary circumstances, decisions about changes to the sample size and stopping rule must be made by someone who has not viewed the emerging

data. You can look (if necessary, e.g. to support a student interim report) but you **MUST NOT** change your recruitment goals and strategy based on your view of the data. Doing this will compromise the goals of the project! If you change your recruitment based on the data, that invalidates the statistical inferences we want to make and introduces exactly the kinds of biases into the data that this project was designed to avoid. If your lab is running pre-specified pilot participants (e.g., to practice the procedure), you may make minor procedural adjustments during that period only.



# 11 Stimuli

## 11.1 Overview

All materials are available in the [MB5 materials directory](#).

Because the sample size possible in ManyBabies projects provides a unique opportunity to test generalizability across multiple stimulus types, we chose two different categories of stimuli: **Fribbuli**<sup>5</sup> and **Fractals**. These two classes of stimuli were chosen because: (1) they allow for variation in stimulus complexity within the same stimulus category (i.e., by manipulating the number of features); (2) infants are unlikely to have previous experience with either set of stimuli; and (3) the inclusion of two stimulus sets allow us to begin examining the generalizability of any observed effect.

We created 12 unique Fribbuli and 12 unique Fractals, operationalizing complexity as the number of features present (these features are appendages in the case of Fribbuli and iterations of the same structure for Fractals; see Figure 3). Within each stimulus type, 6 items were designed to be low-complexity and 6 were designed to be high-complexity

### 11.1.1 ManyFribbuli<sup>6</sup>

Fribbuli are colorful, computer-generated models of 3D figures. All Fribbuli are made up of one of twelve possible body shapes and one (low-complexity) or four (high-complexity) appendages.

**ADD MORE INFO ABOUT COLOR SELECTION, SIZING, ETC**

<sup>5</sup> “Fribbuli” is a portmanteau combining the words “Fribble” and “stimuli”. These stimuli were inspired by the Fribbles stimulus set (Barry et al., 2014)

<sup>6</sup> We’re calling our custom sets of stimuli “ManyFribbuli” and “ManyFractals” because... well, it’s fun.

### 11.1.2 ManyFractals

Fractals are geometric shapes in which the same structure is repeated iteratively at different levels of scale.

**ADD MORE INFO ABOUT FRACTAL GENERATION**

### 11.1.3 Attention-getter stimuli

- **Between Trials:** Please use the provided “laughing baby” stimulus to re-center babies between each trial (i.e., before familiarization begins). If your lab uses a different attention-getting stimulus that you feel is more appropriate for your community, please check with us.
- **Within Trial:** Please use the the “Hoehle circle with chimes” stimulus to re-center babies within each trial (i.e., between familiarization and test and between test phases 1 and 2).

# 12 Procedure

Please adhere to the following specifications for conducting this study. If any of the following technical specifications are not possible for your lab, please contact the MB5 leadership team ([mb5@manybabies.org](mailto:mb5@manybabies.org)) before beginning data collection to inform us of your planned deviation and the reason for it.

## 12.1 Overview

During the experiment, infants will be seated on their caregiver's lap or in a high-chair or car seat (whichever option corresponds to a lab's standard procedure for testing infants, as reported in the pre-data-collection survey).

Each baby will be presented with a series of 12 trials. Each trial is preceded by an attention-getter and made up of a **familiarization phase** followed by two **test phases**.

**There are two versions of the experiment:**<sup>7</sup>

1. ***Fixed-length***, in which the duration of the familiarization phase is pre-established (5s, 10s or 15s)
2. ***Infant-controlled***, in which the familiarization phase lasts until the infant accumulates the specified looking time (5s, 10s, or 15s). In both versions, the duration of each test phase is fixed at 5s.

<sup>7</sup> Participating labs are encouraged to use an infant-controlled procedure, if possible. See section 12.3 for more info.

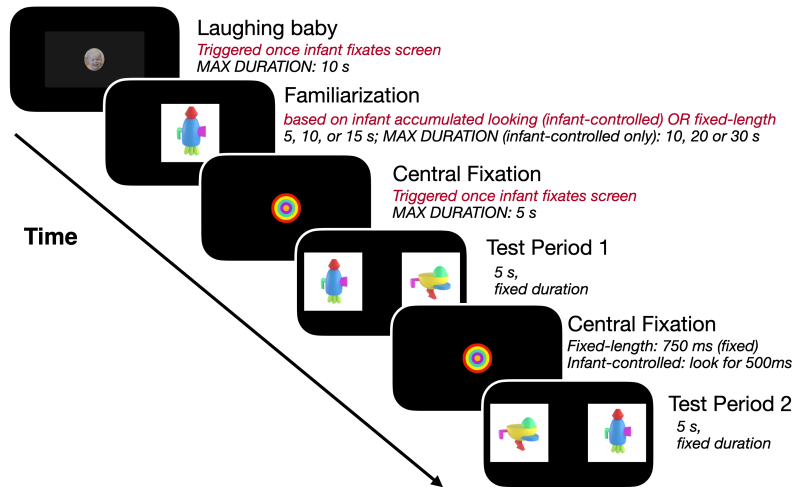


Figure 12.1: This figure depicts the design of an example trial. At familiarization, a single image is shown for 5, 10, or 15s. After the specified familiarization time is reached (based on the *infant-controlled* or *fixed-length* design criteria), infants are presented with a central fixation stimulus for 500ms. During the two test phases (5s each), infants view the same image to which they were familiarized paired with a new stimulus from the same set (e.g., *Fribbuli* or *Fractals*) and the same level of complexity (*low* or *high*). The side on which the familiar and novel images are presented is counterbalanced across test phases within a trial, but the images remain the same.

**Trial schematic:**

**12.2 Trial initiation**

This phase draws infants’ attention (back) to the screen prior to the familiarization using the “laughing baby” stimulus. The trial is initiated when the infant fixates the screen (or a maximum of 10s has elapsed).

**12.3 Familiarization Phase**

In the **familiarization phase**, one stimulus is presented centrally on the screen. There are a total of 12 familiarization events for each infant that vary across three dimensions (see table 12.1):

- 1. Stimulus class (*Fribbuli* or *Fractals*)
- 2. Complexity level (*low* or *high*); and
- 3. Familiarization time (*5s*, *10s*, or *15s*)<sup>8</sup>

The order of these trials will be counterbalanced along a number of dimensions across participants and labs.

Table 12.1: Familiarization events (*Note: Order of events will be counterbalanced across participants*)

Event	Familiarization Time (s)	Stimulus Class	Complexity Level	Example Stimulus
1 2 3	5 10 15	Fribbuli	Low	
4 5 6	5 10 15	Fribbuli	High	
7 8 9	5 10 15	Fractals	Low	
10 11 12	5 10 15	Fractals	High	

<sup>8</sup> Familiarization time specifies the duration of the familiarization phase (*fixed-length* design), or the duration of accumulated looking time needed to end the familiarization phase (*infant-controlled* design).

**12.3.1 Infant-Controlled Familiarization**

If your lab is running the infant-controlled version of the study, infants may accumulate the required familiarization time across

multiple looks before advancing to the test phase. The familiarization stimulus will remain on the screen until the infant has looked at the stimulus for the specified duration (as determined by an experimenter coding infant looking in real time).

We will additionally implement a **maximum trial length criterion**: if infants do not accumulate the required looking time within twice the specified familiarization duration (i.e., 10, 20, or 30s), the familiarization phase will end.

### 12.3.2 *Fixed-Length Familiarization*

If your lab is unable to run an infant-controlled design, then you will present the familiarization stimulus for a specified duration (5, 10, or 20s) before advancing to the test phases.

## 12.4 Test Phase

In each **test phase**, the object seen during familiarization (the *familiar* object) is presented side-by-side with a *novel* object. The location (left/right) of the *familiar* and *novel* stimuli will be switched in the two test phases (e.g., if the *familiar* object appears on the left in the first test phase, it will appear on the right in the second test phase).

Once the familiarization criterion has been reached (either via accumulated looking or fixed-length presentation), the infant will be presented with a central-fixation stimulus (looming circle). Once the infant fixates the screen (or a maximum of 5s has elapsed), the first test phase will begin. Each pair of test stimuli includes the stimulus to which the infant was familiarized (the *familiar* object) and a previously-unseen stimulus (the *novel object*) from the same stimulus class (*Fribbuli* or *Fractals*) and complexity level (*low* or *high*) as the familiar object. Infants will view the test stimuli for a total of 10s, separated into two sub-phases. They will be presented with the familiar and novel stimulus for 5s after which a central fixation stimulus will be presented. The infant will then view the second 5s test phase, which uses the same two stimuli but with the location flipped

(i.e., the image that was on the left in phase 1 will be on the right in phase 2).

# 13 Apparatus

## 13.1 Equipment

The minimal equipment required to run this experiment is:

- Computer running experiment software (see below)
- Monitor/television for stimulus display
- Camera for capturing infant looking behavior<sup>9</sup>
- Mixer for syncing recording of infant with stimulus timing (or other method for doing so)

<sup>9</sup> not needed if infant's face is captured by eye tracker

Additional (optional) equipment:

- Eye tracker
- Blacked-out glasses for parent to wear during experiment

## 13.2 Software

We assume you will use an experimental software (e.g. Matlab, Habit, E-Prime, Psychopy, OpenSesame or custom software) to run the study and one of two settings to record looking times: (1) Offline Video recording (2) Eye-tracker (e.g. Tobii, EyeLink, SMI, ASL, or a different company, with appropriate software from the eye-tracker or custom software). (3) Eye-tracker + video recording. We also assume you know how to set up looking-time studies on your equipment. If that is not the case, or if you need help, support is available from the following people:

- PsychoPy:
- PyHab:
- Tobii:
- Eyelink:



- Other systems: email us [mb5@manybabies.org](mailto:mb5@manybabies.org) and we'll do our best to help out

## **14 Data Validation**

## 15 Prior to data collection checklist

The steps for getting started are tracked by the MB5 leadership team on the MB5 Project Tracker. You can check it to see what steps your lab has completed. If you have any questions or think your lab's progress is not up-to-date, contact us ([mb5@manybabies.org](mailto:mb5@manybabies.org)).

After preparing your lab and BEFORE BEGINNING DATA COLLECTION you need to:

- Complete the Initial Sign-Up Form (if you have not already done so).
- Confirm ethics approval is uploaded: Make sure that a copy of your lab's ethics approval is in this google drive folder. If you plan to share participant videos via Databrary, you should also make sure you are getting proper consent for video sharing (please include approval for video sharing in ethics upload).
- Confirm demographics form is uploaded: Make sure that a copy of your lab's demographics form and ethics approval is in this google drive folder.
- Confirm walkthrough video is and demographics form uploaded (if needed): Make sure that a copy of your lab's walkthrough video is in this google drive folder, and your laboratory demographics form in this google drive folder.
- Complete the Lab Questionnaire: Make sure someone from your lab has filled out the Lab Questionnaire with details about your laboratory. The leadership will be notified of your submission of the Lab Questionnaire after which they will start the approval/greenlighting process.
- Convert dummy or pilot data into the right format for submission (see details below) using the MB Data validator to check data validity; in case of questions, please

contact the analysis team. This ensures that you will be ready to submit your lab's data to the central analysis team!

- Send email to Jessica Kosie (jkosie@asu.edu) to let the leadership know that you are ready for 'greenlighting'.
- Wait until you receive an official go-ahead from Project Leads before you begin testing. We may have questions for you, e.g. about your planned protocol deviations. We will do our best to respond quickly, but If you don't hear from us within a week of sending the email, please contact us again!.

## **Part IV**

# **Running the experiment**

## 16 General Lab Practices

### 16.1 Training research assistants

You are responsible for implementing rigorous training practices. Research assistants should be held to the same high standards for ManyBabies as they would be for your main studies. You are free to have any number of research assistants conduct the test sessions, but please aim for as much coding consistency as possible and document which research assistant coded a given baby (using code names such as RA1, RA2, etc. if you wish). You will be asked to report about your standard training practices (e.g., how/when do you determine it's okay for a research assistant to test real babies). Online Coding. If you are using a central screen to gather accumulated looking data for infant-controlled familiarization, then research assistants will need to be properly trained in coding online looking behaviors. Offline Coding. If you are not using an eyetracker to gather data, then you will need to code the test trials offline.

### 16.2 Greeting families

You can greet families, briefly explain the study's purpose and goals in terms understandable to families (avoid technical jargon), obtain informed consent, and conduct the appointment as you normally would. Acknowledge their decision to consider participating and express appreciation for their time. Address potential concerns families might have and answer their questions openly and honestly.

## **16.3 Compensating families**

You can use your lab's standard, IRB-approved method for compensating families. This can include providing small gifts, cash, travel reimbursement, taxi rides, or other incentives for participation as you normally would. Participating labs are responsible for compensating their own participants.

# 17 Testing conditions

## 17.1 Piloting and other non-primary data

Some labs might wish to pilot their design on a small number of infants in order to work out problems with the setup and allow experimenters to practice the protocol. Piloting with this purpose is indeed encouraged! It is critical to the integrity of the ManyBabies project that these pilot data are carefully differentiated from your main contribution. You do NOT need to report pilot data in your spreadsheet, but if you do, please ensure that you properly mark them as such in the designated Pilot column. You must make an explicit decision to begin non-pilot data collection at a particular date - this decision cannot be retroactive, and cannot be based on inspection of the pilot data (i.e., you cannot choose to include a pilot participant in the actual sample if the data “looks good”). Some labs might plan to test additional babies beyond the primary sample (e.g., with additional manipulations). These data will not be included in our primary planned analyses, and will not count toward the minimum contribution, but these additional datasets are welcome, and we encourage researchers to pre-register other hypotheses. You are free to publish these “side studies” on your own terms, but please keep in mind the restrictions on publishing the main dataset if you are using it as a comparison/control sample (see the section on Open Science Policies in the MB General Manual).

### 17.1.1 Caregiver bias and instruction

Caregivers should be masked from viewing the visual stimulus using your lab’s standard method (e.g., having caregivers wear taped-over sunglasses). It is not necessary to block parents’ hearing of the audio stimulus. Instruct parents NOT to point to



the lights or screen, shift their bodies, or move their chairs if the baby is inattentive. Emphasize during the instruction/setup that infants' boredom with some of the stimuli is part of the experiment and is OK. Suggestion: to ensure that the infant and parent are as comfortable as possible, you may tell the parent that it is okay to shift their or their baby's body to a more comfortable position, or provide interaction that the baby is soliciting, but emphasize that this may be done only for a short period during the attention grabber phase (e.g., when they hear the laughing baby).

### **17.1.2 Collecting participant information**

We aim to integrate our testing procedure with your lab's procedure as much as possible, but there is some amount of information that we need to gather in a standardized fashion.

Participant information: Please use this Family Background Questionnaire to collect the information. You are welcome to adapt the format as long as the wording is not changed, except as noted: Any areas marked in green you can adapt to ensure they are appropriate to your country/region. However, please keep the wording as similar as possible to ensure consistency in reporting. The question on race/ethnicity can be adapted to meet the norms of your region. If possible, please use racial/ethnic categories taken from local census categories. For countries where it is not considered socially or legally acceptable to inquire about ethnic background, please adapt to a more appropriate question (e.g. parent and child place of birth), if possible. Translations into other languages will be available here as they are created. If you need to make changes other than as indicated above, please contact the leadership team to discuss your concerns. Let us know if any of the questions are unclear to you - it is important that you are able to answer any questions the participants may have. Please also check the participants' answers to avoid blank responses. If you modify any of the wording in the form, even in the green sections, or translate the form to your lab's local language please upload a blank copy of your form using the MB5 documentation upload form. Please ensure that your form is clearly labeled in the filename with your LabID (e.g. babylabPrinceton\_background.pdf).

### **17.1.3 Experimenter blindness**

The experimenter should be masked from blind to trial details, by being either (1) in a different room, with no way of knowing which stimuli the baby is seeing on each trial, or (2) in the same room but facing away from the stimuli and unaware of what is on the screen.

### **17.1.4 Sound volume**

Your lab can use whatever volume level has been used successfully in the past, but please standardize your volume for this study so that every baby gets stimuli at the same volume.

## **18 During data collection**

### **18.1 Restarts, recalibration (eye-tracker) and pauses**

Any pauses in the procedure can potentially lead to an erasure of the weak memory trace for the familiarization stimuli (Gerken, p.c. noticed a loss of effect if there is a 30+ second pause between familiarization and test phase). Therefore, we ask: NO RESTARTS. Do not restart any trials, regardless of short looking, fussiness, experimental error, etc. Very short trials will be excluded centrally during the analysis process, but should be fully reported and not repeated. DO NOT RECALIBRATE (eyetrackers) once the session has started. Pauses: If babies are fussy, it can be necessary to attempt to get them settled. You may use the natural pause of an attention getter to let the parent non-verbally resettle their baby for a very short time (a couple of seconds, according to your practices). However, longer pauses should result in the cessation of the study. Suggestion: if the baby is fussy and you would like to try to continue the experiment after the baby calms down just so that the parent gets the full experience, you are welcome to do so, but this data must be excluded. For these babies, you would report any data collected before the actual experiment terminated from fuss-out/inattention, not the repeat or continued demonstration.

### **18.2 Exclusions and reporting errors and infant “fuss-outs”**

Decisions regarding discards for experimental reasons will be made centrally and need to be reported consistently, hence it

is important to retain all data from all infants that entered the testing room. Specifically, the data you send in for central analysis should use the “toe in the testing room” standard: if the infant made it so far as the testing room, the Pparticipant Data files dataset should include their data. In ManyBabies studies, we do not discard “partial data.” It is important for both reporting purposes and potential secondary analyses to have full information about both “usable” and “unusable” trials, even for infants who did not complete or provide usable data for all familiarization and test trials. Trial-level exclusions may not result in the exclusion of the participant from the dataset. These instructions are counter to many labs’ normal internal practices, so please ensure that RAs are fully trained on this element. There are specific columns in the data templates to report the reasons that some of this data should not be included in the main analysis; every lab is expected to report at least some ‘unusable’ data!

### **18.2.1 Session-level and trial-level errors**

There are two possible kinds of exclusion: session-level (exclude all data from this participant from analysis) and trial-level (exclude just this trial, e.g. because there was interference or the baby had already fussed out). Session-level errors are reported in the Participant Data file and trial-level errors are reported in the Trial Data file. Most lab-reported errors will be “trial-level” errors. If the infant completed any trials, please do NOT report the infant as a session-level error EVEN IF YOU LATER REALIZE THE CHILD DOES NOT MEET ALL INCLUSION CRITERIA. Medical issues and developmental concerns. Please do not exclude based on medical issues / developmental concerns. Instead, provide sufficient detail in the ‘medical\_issue’ and/or ‘developmental\_concern’ fields for the analysis team to review and categorize centrally. As with all exclusions, it is important to include these in your data if the infant entered the testing room.

For clear-cut judgements such as age, please just use the appropriate columns to report the values that would result in exclusion (e.g. “age = 3 years”). For subjective judgements

such as whether the baby was too fussy, the central decision will be made based on the original coder/RA's judgment, since it would be impractical to review comments/videos and make the decision centrally. Therefore, please be very clear (but succinct) in the 'trial\_error\_info' and 'session\_error\_info' fields about whether a given trial should be discarded and why. Please classify as one of the listed 'Value example' options in the Data Dictionary where possible. Use the "other" category sparingly and only if absolutely necessary. In the 'notes' column, please provide further succinct but sufficient information so that it is clear why a given trial or infant was excluded (e.g. "mom pointed at the screen"). Remember that this will be the only information that will be available to the analysis team as they compile and analyze the dataset; ambiguous entries will be problematic for data analysis!

### **Session-level errors**

Session level errors are those which result in discarding the data for a participant completely. Session level errors include: Fuss-out after entering the testing room but prior to starting the experiment Parental interference affecting ALL trials (e.g. caregiver refuses to wear the eye covering properly through all trials, or chronically failing to comply with experimenter instructions such that the validity of the entire session is in question). Experimenter error that makes the entire session unuseable (e.g. ran the wrong test session). Equipment failure that makes the entire session unuseable (e.g. video was not playing properly) Failure to calibrate (eyetrackers only) Infant was tested but was found to not meet the inclusion criteria (e.g. vision issues reported on the demographics questionnaire). Only in cases where infants did not start the experiment (i.e., did not see any stimuli) due to fuss-out or equipment/calibration failure, labs are welcome to reschedule the appointment to another occasion; please indicate this in the participant data form. With regards to session-level errors: Please make sure to include participants excluded for session-level errors in your Participant Data file. You do not need to report them in the Trial Data file (see below for details about the required formats of these files). Data from infants where session-level errors are

reported do NOT count towards the minimum sample size. Please do NOT mark a participant as a “session-level” error if an infant entered the testing room and completed the first familiarization phase even if they provided no usable test trial data.

### **Trial-level errors:**

Trial-level errors are those which result in discarding the data for a single trial. Each of the 12 test trials should be marked as either ‘no error’ (usable) or ‘error’ (to be discarded). Trials with no usable data should have ‘NA’ marked in their data columns. Your lab will make the decision and report whether a trial should be excluded, as well as the reason why. These can include temporary instances of issues such as: parental interference in the middle of the experiment (e.g. mother speaks to infant during a trial and gets their attention) experimenter error or equipment failure that affects one or more trials but not the entire session transitory infant fussiness involving only a very brief pause in testing (see below for further details on reporting), or fussiness where the infant “fusses out” after the initiation of one or more test trials With regards to trial-level errors note: For transitory fussiness, ONLY mark the trials on which the infant was actually fussy - further exclusions may be implemented centrally, but it is important that any potentially usable trials after a transitory fussiness period be included in the submitted data. For example, if the infant was fussy on trials 8 and 10 but not trials 1-7,9,11 and 12, only trials 8 and 10 should be marked as an exclusion. If the infant provides some usable trials and then “fusses out” so that the study is terminated prematurely, please make this clear by marking ‘NA’ on trials that were not given.

### **Trial level errors resulting in further exclusion:**

In most cases, trial level exclusions should result in exclusion ONLY of the trial immediately impacted by the exclusion (e.g. transitory fussiness, parent distracting baby by scratching their nose). However, in some cases, it may be necessary to exclude all subsequent trials, because of concerns that the

infant is no longer “on task”. If this is the case, please mark all subsequent trials as trial level errors and explain the reasoning in the notes. Some examples of this type of situation: Any time (due to fussiness or other reasons) there is a break between trials of more than a few seconds. Equipment failure that raises concerns about the validity of subsequent trials. Significant parental interference/engagement or external noise that diverts the infant’s attention to the extent that it raises concerns about the infant being distracted across all trials. Note that we have included a test in the robustness checking section of the manuscript about the effect of discarding trials after an initial excluded trial.

**Part V**

**After data collection**



## 19 After data collection

Contact Martin Zettersten (martincz@princeton.edu) with questions about data submission and data preparation (please read text below carefully first!)

### 19.1 Data reporting guidelines

Participant data from all infants entering the lab needs to be reported. Even if the infant fusses out prior to entering the testing room/booth, the data for that infant should be submitted. In the case of fuss-out prior to entering the testing room, only participant data needs to be provided. In all other cases, trial level data also needs to be reported (In some cases it may be the case that all trial data will be missing as indicated by ‘NA’). This provides valuable information for, e.g., secondary analyses regarding fuss-out rates and the timing of fuss-out in the experiment. Data collected after the study has been terminated (e.g. fussy babies who are brought back in for a “second run”) should not be reported; any data collected prior to the complete fuss-out needs to be reported in the usual manner. If you report pilot data, make sure this is indicated as such in the ‘Pilot’ column of the data table. Below instructions are designed to help you share data with the MB5 project team in a format that will minimize analysis errors and maximize the ease of merging datasets from many different labs.

### 19.2 Data templates

The primary deliverables for the project are two data files, filled out by your lab from the templates provided below. Please

download a copy of each template and use a guide for formatting your lab's data. We prefer files in the CSV data format. PLEASE NOTE that saving in this format will remove any formulas or other non-plain-text features of your spreadsheet (e.g., color fills, formatting); all information should be captured in the text within each cell.

Participant Data – A .csv file with one row for each participant, and with columns showing the participant's subject number, age, demographic information, notes on the session, etc. Participant Data - CSV template Trial Data – A .csv file with one row for each trial, and with columns showing the participant's subject number, trial number, trial type, looking time, etc. Trial Data - CSV template IMPORTANT NOTE 1: These two files must use identical, anonymous subject identifiers ('participant\_id'). We must be able to link participant- and trial-level data across files! You can use your lab's normal participant numbering convention (e.g., 001, 002, 003, etc.), as long as participant IDs DO NOT include any private information (e.g., initials, birth date, gender). IMPORTANT NOTE 2: These files must contain de-identified data ONLY. All potentially identifying information should be stripped from your data file before submission. For example, you SHOULD NOT include birth date and test date in your Participant Data file. Instead, use an age calculating tool (e.g., <https://www.calculator.net/age-calculator.html>) to calculate each participant's age in days, and report that value in the 'participant\_age\_days' variable. If you have any questions about ensuring your data is de-identified, email [contact@manybabies.org](mailto:contact@manybabies.org). IMPORTANT NOTE 3: It's really important to remember that these files are designed to be read by a computer program, not a person. So anything that violates the template (e.g., variables that aren't of the specified type, formatting, comments, etc.) will not work. For example, cells in the column "lang1\_exposure" in the participant data file should contain numbers. If you write "80 to 90" this will cause errors because it contains characters in addition to numbers (note: please check questionnaire responses before participants leave the lab to avoid NA responses). If you have questions, comments, or calculations, please communicate directly with the analysis team, rather than embedding them in the data. IMPORTANT NOTE 4: Please do not leave any fields blank. If something does not logically have an answer, or

if you did not collect this information, please mark it as “NA”. Language. If you collect data from children who are learning more than one language, please provide an approximate percentage of exposure to each language, either by parental report, or if it is standard practice in your lab, using a day-in-the-life style questionnaire administered by the RA. The total should add up to 100%.

## 19.3 Data dictionary

MB5 Data Dictionary – This spreadsheet lists all of the variables that need to go into the Participant Data and Trial Data files (Note that there is one worksheet/tab for each data file). Each row contains a variable and that variable’s specified format (e.g., string, integer), set of example values, and description. It is important that your lab’s data follows these specifications exactly in order to allow for data harmonization with the full dataset. MB5 Data Dictionary

## 19.4 Data Validation

After preparing your Participant Data and Trial Data files, please use the MB Data Validator to ensure your lab’s data is in the correct format (MB Validator User Manual). Common issues: If the validator is rejecting your CSV file, it may be due to different country standards around the use of commas as decimal points, etc. in your numeric format. Please use periods (‘.’) and not commas (‘,’) as decimal points. Make sure that there are no stray marks in cells outside of your data range. For example, a space entered in a cell in an otherwise empty row or column will cause an error. If you encounter any unexpected issues please send an email to Martin Zettersten (martincz@princeton.edu). Your data files MUST pass validation before submission.

## 19.5 Data submission

Once your data files have passed validation, please upload both the Participant Data and Trial Data files using the MB5 Data Upload form. Please take note of the following: It is essential that both file names include your ManyBabies LabID. Refer to the LabID list [here](#) to find your lab’s unique LabID. Use the following naming convention for your Participant and Trial Data files: `yourLabID_participant_data.csv` (e.g., `babylabPrinceton_participant_data.csv`) `yourLabID_trial_data.csv` (e.g., `babylabPrinceton_trial_data.csv`)

### 19.5.1 Sharing ‘raw’ data

For most labs, the “raw” data generated by the software that runs the study will be in a different format from the one we are asking labs to submit as their machine-readable, de-identified data. This creates a problem for reproducibility of the data pipeline. In addition to potential error-checking, the raw data may be useful for secondary analysis. Secondary analyses can be used to map variability between labs. Ideally, we would ask all labs to share both their actual raw data (immediately generated when the study is run) together with any code they use to convert it to the submission format. However, doing so would likely raise concerns about the sharing of de-identified data as these raw data outputs may contain birthdates or other participant-identifying information. A related concern is that many labs may be converting the raw data into the submission formatted files by hand, which may be prone to human error. We strongly encourage labs to develop processes for making these conversions in an automated way (e.g., in an R script). In the coming months we will be soliciting suggestions and reviewing the practicality of helping labs develop these practices, as well as making a decision about whether and how to collect raw data from labs that do not use eyetrackers. We welcome comments and suggestions from contributors on this issue!

### **Submitting raw eye-tracking data**

There are additional considerations for labs submitting eye-tracking data. First, the raw data is useful for studying variability between labs in the extraction of looking times. Second, the pupil size data provides interesting additional information about cognitive processing that can be used in follow-up or spin-off studies. We are therefore asking all laboratories submitting eye-tracking data to provide these raw data. For the data to be most useful and accessible for secondary analyses, the preferred format is to submit 1) CSV or TSV files (or any other plain text format); please select the export options so that the file remains as unchanged as possible (select all possible variables, no fixation filters, etc.) and 2) annotated R-code (or other script) that transforms these CSV or TSV files into the trial-level format that needs to be submitted. Please upload these files using the MB5 Data Upload form in addition to the Participant Data and Trial Data files (see above for details). For purposes of transparency and replicability, using a standardized format for the eye-tracking data is preferable (e.g., the Peekbank format). Please take care that the raw eye-tracking data does not contain any identifying information such as birth dates, zip codes, etc.! If you have any concerns regarding the sharing of your raw data (e.g. with respect to participant consent/ethics approval), please contact the project leaders. In the Lab Questionnaire, report which method you used to compute the looking times. In your upload, please also include the (annotated!) script that was used to compute the looking times from the raw data.

## **19.6 Video records of data collection (optional)**

If you are sharing videos of your data collection (and this is strongly encouraged, if it's at all possible given your ethics approval), you can store them in Databrary if you are a member. The naming convention for Databrary volumes is "ManyBabies5: yourLabID" (e.g. "ManyBabies5: babylabPrinceton"). We ask that you use this naming convention so people can easily search for all the ManyBabies-related volumes.

**Thank you for being part of  
ManyBabies 5!**

## References

- Barry, T. J., Griffith, J. W., De Rossi, S., & Hermans, D. (2014). Meet the fribbles: Novel stimuli for use within behavioural research. *Frontiers in Psychology*, 5. <https://doi.org/10.3389/fpsyg.2014.00103>
- Hunter, M. A., & Ames, E. W. (1988). *A multifactor model of infant preferences for novel and familiar stimuli* (pp. 69–95). Ablex Publishing.
- Kosie, J., Zettersten, M., Abu-Zhaya, R., Amso, D., Babineau, M., Baumgartner, H., Bazhydai, M., Belia, M., Benavides, S., Bergmann, C., Berteletti, I., Black, A. K., Borges, P., Borovsky, A., Byers-Heinlein, K., Cabrera, L., Calignano, G., Cao, A., Cox, C. M. M., ... Lew-Williams, C. (n.d.). *ManyBabies 5: A large-scale investigation of the proposed shift from familiarity preference to novelty preference in infant looking time*. <https://doi.org/10.31234/osf.io/ck3vd>
- Singh, L., Barokova, M. D., Baumgartner, H. A., Lopera-Perez, D. C., Omane, P. O., Sheskin, M., Yuen, F. L., Wu, Y., Alcock, K. J., Altmann, E. C., Bazhydai, M., Carstensen, A., Chan, K. C. J., Chuan-Peng, H., Dal Ben, R., Franchin, L., Kosie, J. E., Lew-Williams, C., Okocha, A., ... Frank, M. C. (2024). A unified approach to demographic data collection for research with young children across diverse cultures. *Developmental Psychology*, 60. <https://doi.org/10.1037/dev0001623>

## **A Collaboration Agreement**



# ManyBabies 5 Collaboration Agreement

This agreement describes how work on the [ManyBabies 5](#) project will be structured and credited. The purpose of this agreement is to clarify contributor roles and expectations in the interest of transparency.

## Conduct

**Each contributor is personally accountable for the accuracy and integrity of their work on this project.** This includes ensuring that (1) you are operating in accordance with your local research rules and regulations and global norms of research ethics (e.g., [Declaration of Helsinki](#)), (2) you abide by the [MB Code of Conduct](#) and this Collaboration Agreement at all times during your participation, (3) your specific research products are honest and accurate (e.g., data, translations, code), and (4) your description of your role on the project is accurate. **Contributors should indicate their agreement to the Code of Conduct and Collaboration Agreement by completing the MB CRediT Self-Report Form at the onset of their project participation** (see Authorship section below for more details).

All projects should comply with the [ManyBabies Code of Conduct](#). Project Leads are responsible for ensuring that all project contributors have read and agreed to comply with the Code of Conduct and this Collaboration Agreement before initiating involvement in the project.

## Anticipated products

We anticipate that this project will result in:

1. A paper to be preprinted at [PsyArXiv](#) and submitted to the journal *Nature Human Behaviour*
2. Multiple conference presentations
3. Stimuli, experiment software, and an experiment protocol to be shared on Open Science Framework ([OSF](#)) for reuse after the preprint is published
4. Raw video data (from labs with permission to share and parental consent), to be shared on [Databrary](#) and indexed with the label “ManyBabies5”
5. Looking-time data, to be shared via [GitHub](#) and/or OSF
6. Participant information (de-identified), such as age and language exposure, to be shared via GitHub and/or OSF
7. Analysis code, to be shared via GitHub and/or OSF

These anticipated products might change/evolve over the course of the project and are meant to serve as an expected set of products rather than an exhaustive list. Contributors will be notified of any updates or changes to anticipated products via the project listserv.

## Roles and responsibilities

All project contributors are expected to abide by this **Collaboration Agreement** regardless of contribution role, and to self-report contributions accurately using the **MB Contribution Reporting form**. We welcome individuals making contributions in more than one domain, and note that **data collection is not a required contribution for authorship** (see Authorship section for more information). Please make sure that you report any changes to your role in a timely manner to ensure that you get proper credit for all of your contributions.

Below is information about specific project roles and their respective responsibilities.

### **A.0.1 Project Leads**

- Formulating the research goals and aims
- Providing repeated opportunities for scholars of any career stage to contribute to the project
- Creating, maintaining, and sharing project-specific documentation (Collaboration Agreement, Lab Manual, etc.)
- Organizing project-specific information on OSF, Google Drive, GitHub, etc.
- Documenting project progress from beginning to end, including timely website and newsletter updates
- Coordinating the work of all other teams via regular meetings and check-ins
- Ensuring that MB policies are followed
- Coordinating the organization of lab IRB ethics approval documents
- Actively answering project-related questions
- Supporting exchanges on Slack or other communications platform that aids project administration (e.g. ensuring that questions about procedure and setup are answered)
- Coordinating manuscript submission and pre-print services
- Ensuring that all study materials (e.g., stimuli, analysis code, anonymized data) are properly archived and publicly accessible at the earliest possible stage, and at the time of publication at the latest

### **A.0.2 Methodology Team**

- Developing study materials (e.g., stimuli, experiment files, questionnaires) and procedure(s)
- Providing all scripts used during stimulus creation, and exhaustively documenting all reasoning behind stimulus creation and selection decisions
- Leading the coordination of materials translation and adaptation as needed
- Providing clear instructions on how to set up the study for participating labs

- These instructions should be publicly available at the time of publication and allow for a direct replication
- Troubleshooting methodology issues as needed
- Contributing to the Method section of the manuscript
- Reviewing and (if desired) providing feedback on the remainder of the original and revised manuscript
- Maintaining regular communication with the Project Leads

### A.0.3 Data Collection Teams

*\*Note: The expectation is that each data-collecting laboratory will be represented in authorship by one or two researchers (e.g., a lab PI who oversees data collection, and a student or RA who is primarily responsible for data collection). Requests to include more than two researchers from a lab must be approved by Project Leads.*

- Obtaining and documenting ethics approval for data collection, as locally appropriate
- Creating and sharing a short “walkthrough video” of lab set-up and testing procedure, as appropriate
- Ensuring that all ManyBabies and project-specific data collection guidelines (e.g., collecting data from the agreed-upon number of participants, following stopping rules, submitting data from any infant who enters the lab) are followed
- Ensuring all ethical practices (e.g. properly obtaining consent, anonymizing data as needed, etc.) are followed
- Making reasonable efforts to check and ensure data quality (e.g., checking manual data entry, documenting issues reported by research assistants and participants)
- Following data formatting guidelines and confirming correct formatting by using the [MB Data Validator](#) prior to submission
- Documenting and reporting issues to the Project Leads
- Assisting with materials translations
- Responding efficiently to project-related correspondence

- Reviewing and (if desired) providing feedback on the original and revised manuscript
- Ensuring all authors on the team maintain an active email contact on the project mailing list until the project is fully complete (normally the time that the peer-reviewed manuscript proofs have been finalized)

#### **A.0.4 Data Analysis Team**

- Setting up the data validator and creating a data template for data collection teams
- Specifying in detail the confirmatory analyses for Stage 1 submission, together with analysis code, and (where possible) analyzing pilot data to illustrate its appropriateness
- Conducting a power analysis to estimate the required sample size prior to the Registered Report submission
- Analyzing data and (in collaboration with Project Leads) coordinating external code review, and (normally) writing the Results section of the peer-reviewed manuscript.
- Sharing analysis code (with clear comments) publicly via GitHub or a similar service (linked to OSF)
- Ensuring that shared data are fully anonymized prior to public release
- Contributing to the Analysis Plan section of the Registered Report and the Results section of the Stage 2 manuscript
- Reviewing and (if desired) providing feedback on the remainder of the original and revised manuscript
- Maintaining regular communication with the Project Leads

#### **A.0.5 Writing Team**

- Writing the original manuscript draft, in consultation and collaboration with the Methodology and Data Analysis Teams
- Soliciting feedback on manuscript drafts and reviewer comments from the full project team

- Incorporating feedback and developing a revised manuscript draft
- Maintaining regular communication with the Project Leads

## Authorship

### How do I become an author on a paper that results from this project?

All project contributions will be documented via an adaptation of the [CRediT taxonomy](#) using an authorship spreadsheet generated from the project's [MB Contribution Reporting Form](#). All authors, regardless of whether they are part of the writing team, must review the final manuscript and will be given the opportunity to provide feedback prior to submission. In addition, all authors must make a substantive contribution to at least one of the roles outlined above and report their contribution(s) via the corresponding MB CRediT category(s).

If you contribute to the project in the manner outlined above, you are eligible for authorship. Contributions will be compiled in the [MB CRediT table](#) and this information will be appended to (or referenced in) all relevant scientific products (e.g., manuscript) in accordance with journal guidelines.

In general (and except in very limited circumstances), authors will not be added to a manuscript (e.g., Stage 1 Registered Report) between the first submission to a journal and subsequent revisions. In the case that a change to authorship is deemed appropriate by Project Leads, all authors will be notified of the proposed change via project listserv and be given at least one week to object to the change. Depending on the policies of the journal, authorship changes will be (1) approved on behalf of the consortium by the corresponding author (preferred) or, (2) approved by each author individually.

**[Note:** Given the nature of MB projects, it is likely that many (if not most) authors will contribute to the project as a member of a data collection team only (corresponding to the “Investigation” CRediT category). For all authors, including those who

plan to collect data, authorship on Stage 1 manuscripts will be based on **planned** contributions and authorship on Stage 2 manuscripts will be based on **actual** contributions. It is expected that authors will join the project in response to a call for data collectors after the Stage 1 manuscript has been accepted.]

### **How do we handle dissenting opinions about scientific products?**

In large-scale collaborations, disagreements are inevitable. Whenever possible, decisions will be made using a consensus-based decision-making process. Project Leads are expected to carefully consider dissenting opinions from collaborators and, to whatever extent is reasonable, discuss the issue with the dissenter and with all active team members/contributors when appropriate. In some cases, decision-making may default to democratic voting; however, this will not always be deemed the best approach. Where consensus can't be reached, final decisions about the scientific product will ultimately be left to the Project Leads.

### **How will authorship order be determined?**

Authorship order will be organized into the following sections, with order determined as listed below:

*Section 1 (First Author(s)):* Main proposer(s) (as determined by consensus of Project Leads) listed first, ordered based on contribution, followed by remaining Project Leads, ordered reverse alphabetically.

*Section 2 (Team Leads/Other Significant Contributors):* Leaders of working groups (e.g., methods, analysis, writing) and others who have made significant/leading contributions (as determined by Project Leads), ordered reverse alphabetically.

*Section 3 (Other Contributors):* Remaining project contributors not specified in other sections, ordered reverse alphabetically.

*Section 4 (Senior Authorship):* Project Leads designated as senior authors (as determined by consensus of Project Leads), ordered in reverse based on contributions.

[**Note:** A note describing this ordering procedure will be added to the author notes]

### **How do we handle authorship on secondary papers for this project?**

[For comprehensive information on ManyBabies policy regarding secondary projects, please see the section “Policies on Derived Projects and Presentations” in the [MB General Manual](#).]

It is possible that this project results in secondary papers that are based on the project’s research products. Prior to the full public release of the main project, secondary papers should only be initiated with the consent of the Project Leads. After full public release, projects may be freely initiated without any special permissions from the Project Leads. The only exception to these rules are projects with a primarily pedagogical purpose (for example, undergraduate or Master’s theses). These may be initiated at any time without any special permissions from the Project Leads, as long as the written reports based on these projects are not disseminated publicly before the full public release of the main project. If you are working on an educational project and your institution requires posting your thesis to a public repository (such as a library repository), contact the Project Leads for guidance.

All secondary projects should be governed by their own collaboration agreement. By default, authors on the main paper will not be counted as authors on secondary papers unless they also become involved in the work of these secondary projects. All secondary papers should cite the primary written public report of the main project.

All secondary projects involving ManyBabies collaborators should be announced to the Project Leads and all outputs of secondary projects should be reported to ManyBabies via the [activity and initiative tracking form](#).



### **How do we handle the use of project materials/data for other derived projects and presentations?**

All other uses of project materials and/or data (e.g., for department or conference presentations) are subject to ManyBabies' policies on derived projects and presentations. Please refer to this section in the [MB General Manual](#) for more information, and direct all questions to Project Leads and/or the MB Executive Director ([contact@manybabies.org](mailto:contact@manybabies.org))

### **Press and public reporting of ManyBabies results**

Initial press releases will be coordinated by the Project Leads and ManyBabies leadership once the paper is accepted or at any time point the leads deem suitable for wider dissemination. All press releases must (a) prominently highlight the role of the MB collaborative network, and (b) link to MB contacts. All collaborators are encouraged to speak to the press, but are expected to (1) emphasize the highly-collaborative nature of the research project and (2) encourage the interviewer to reach out to various members of the team. The content of the press release and paper is embargoed until the time and date clearly stated on the press release.

### **Changes to this Collaboration Agreement**

As the project evolves, changes may be made to this collaboration agreement. In those instances, all collaborators will be notified of the change via project listserv and a list of recent changes will be listed at the top of the document. Contributors will have one week from the time of notice to object to changes, and all reasonable efforts will be made by Project Leads to address any concerns/objections. If such concerns/objectives cannot be resolved through discussion and/or mediation, the Governing Board will have final discretion.

## Contact info

We encourage you to ask questions and raise concerns about project-related matters as soon as possible. You can direct all questions and concerns to [jkosie@asu.edu](mailto:jkosie@asu.edu), [mzettersten@ucsd.edu](mailto:mzettersten@ucsd.edu), and/or [caseylw@princeton.edu](mailto:caseylw@princeton.edu). If you have an issue or concern that you would like addressed by MB leadership, you can contact the [MB Executive Director](#) or the [MB Governing Board](#).

- 
- *Authored by:* ManyBabies (adapted from the Psychological Science Accelerator Collaboration Agreement template)
  - *Amended by:* Jessica Kosie, Martin Zettersten, Christina Bergmann, Dima Amso, Casey Lew-Williams
  - *Reviewed by:* J.K., M.Z., C.L.-W., Heidi Baumgartner
  - *Date updated:* 2022-04-29