This folder (7.16.14\_Manner\_Result\_Generalization\_Study\_AGeojo) contains materials for three experiments that explored Rappaport-Hovav & Levin’s (2010) theory that all eventive verbs can be distinguished into one of two broad semantic classes: MANNER and RESULT.

All three experiments examine generalization of lexicalization bias for motion verbs to caused change of state verbs and vice versa.

* Stimuli for caused change-of-state verb trials are the same across experiments.
  + Instrumental means verbs, novel verbs appear in transitive sentences with the affected entity as the direct object (DO frames)
* Stimuli for motion verbs:
  + Experiment 1: agentive manners-of-motion, novel verbs in intransitive sentences with path-encoding prepositional phrases (PP frames)
  + Experiment 2: instrumental manners-of-motion, novel verbs in PP frames
  + Experiment 3: agentive manners-of-motion, novel verbs in DO frames

The first eight trials of each experiment use the verb learning and extension paradigm to manipulate participants’ biases for either motion or change-of-state verbs.

Participants are randomly assigned without replacement to one of the following verb learning conditions: manner-of-motion, path, means, effect

During trials 9-16, participants who learned motion verbs are asked to extend novel change-of-state verbs while those who learned change-of-state verbs are asked to extend novel motion verbs.

Bias transfer from motion to change-of-state is assessed by comparing how manner-of-motion and path verb learners interpret caused change-of-state verbs on trials 9-16.

Bias transfer from change-of-state to motion is assessed by comparing how means and effect verb learners interpret novel motion verbs on trials 9-16.

The hierarchy below mirrors the organization of files within the folder containing all stimuli and data for these experiments. (7.16.14\_Manner\_Result\_Generalization\_Study\_AGeojo)

# 7.16.14\_Manner\_Result\_Generalization\_Study\_AGeojo:

## 1\_Data

This folder contains 3 folders, one for each of the three experiments (Experiment 1, Experiment 2, Experiment 3). Each have the same internal structure.

This is illustrated for Experiment 1.

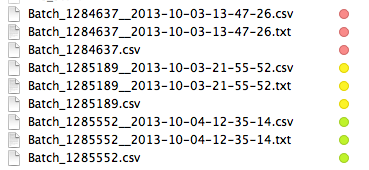
### Experiment 1

Motion: Agentive manners-of-motion in PP frames

Change-of-state: Instrumental means in DO frames

#### 1.1\_RawData

The files are separated into three groups differentiated by the color. Each group contains data from one sample of participants. This is also indicated by the shared Batch number.



The .csv file with only a Batch number was generated by AMT and stored on their server. It includes basic information that AMT auto-generates (e.g., WorkerId, BatchNumber etc) as well as three responses provided by workers: answers to 2 demographic questions (country of origin and native language) and a [PayCode](#PayCode) (see below).



The other documents, which are identical except in format (.csv and .txt), contain raw data collected from subjects: responses to lexicalization bias and test of verb learning questions. These files also include other relevant information (e.g., the subject’s condition; the order in which items were presented etc.)[[1]](#footnote-1)



#### 1.2\_dataMod

Raw data is ‘[cleaned’](#_3_Code_R) in two steps.



The first file merges the data from AMT with the bias and test data (+ condition information) collected from participants (and stored on AWS EC2 server). This results in the removal of any data that cannot be matched on the basis of PayCode.



The second file filters out participants that are not native speakers of English and excludes trials and subjects that are invalid due to streaming-related issues (see Methods section of Paper)

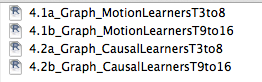


The third file contains the final data set with only valid subjects and trials. Lexicalization bias and test accuracy have also been computed.

This is the data used for all descriptive/inferential analyses.

#### 1.3\_Graphs

Scripts for graphs of lexicalization bias data from part1 and part2 of the study by condition.



The first two graphs present data comparing participants in the manner-of-motion and path verb learning conditions (Graph\_MotionLearners).

> 4.1a depicts lexicalization bias for novel motion verbs on trials 3-8 (T3to8)

> 4.1b depicts lexicalization bias data for novel caused change-of-state verbs on trials 9-16 (T9to16).

Because they are motion verb learners, they see motion verbs during the first 8 trials and change-of-state verbs during the last 8; the latter responses are indicative of transfer of bias across semantic fields.

Similarly, the “4.2” graphs depict lexicalization bias for caused change-of-state verb learners (Graph\_CausalLearners): Means vs. Effect conditions.

> 4.2a depicts bias for novel change-of-state verbs on trials 3-8 (T3to8)

> 4.2b: bias for novel motion verbs T9-16.

These are generated using [scripts](#_Graphs) found in the 3\_Code\_R folder.

### Experiment 2:

Motion: Instrumental manners-of-motion in PP frames

Change-of-state: Instrumental means in DO frames

### Experiment 3:

Motion: Agentive manners-of-motion in DO frames

Change-of-state: Instrumental means in DO frames

## 2\_Stimuli\_\_mTurk\_Run\_MannerResultExperiments\_Python\_HTML\_EC2

### 1\_Manner\_Result

This folder contains all files necessary to run the experiment except for the videos, which are found in [2\_Videos.](#_2_Videos)

The only exception are the MovieCheckVideos, which are used during to check if the participant is able to stream videos in any of the formats we have.



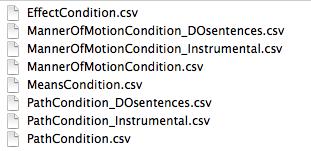
This is the script that runs the experiment. The HTML and .csv files present in this folder are called by the script using a library, Willow, which is a server client and allows web pages to be called and data retrieved.



The folder containing all scripts for the Willow library must be in the same folder as the HTML and .csv files:



The following are the .csv files with all information corresponding to stimuli for different conditions (as named).



Experiments 1-3: MeansCondition and EffectConditions

(Stimuli were the same across all three experiments. (Instrumental means; novel change-of-state verbs in DO frames)

Experiment 1: MannerOfMotionCondition & PathCondition

(Agentive manners of motion; novel motion verbs in PP frames)

Experiment 2: MannerOfMotionCondition\_Instrumental & PathCondition\_Instrumental

(Instrumental manners-of-motion; PP frames)

Experiment 3: MannerOfMotionCondition\_DOsentences & PathCondition\_DOsentences

(Agentive manners-of-motion; DO frames)

Overview of process for running experiments:

Experiments were posted as External Hits on Amazon Mechanical Turk (AMT).

The main frame (mTurk\_frame\_MannerResult.html) entered into the Amazon Mechanical Turk interface includes: a brief description of the study, study requirements, demographic questions, the link to the study, and a text box.

Participants were informed that they would only be compensated if they entered the alphanumeric string (PayCode) provided at the end of the study into this text box. The PayCode is critical as it is the only way to associate a particular worker with their data. (Data from workers that start the experiment but decide to return the HIT as well as test runs I conducted are stored in the same .csv & .txt file on the server).

If a worker accepted the HIT, they were asked to indicate their country of origin (only workers with IP addresses originating in the US were able to see the Experiment) and native language. These responses, along with the PayCode, were entered into the main frame and treated by AMT as an internal HIT. This data was stored as [a .csv on the AMT server identified by a unique Batch Number](#amtData).

Participants were re-routed to an EC2 Amazon Web Server (size large) from which the experimental script ( was run. Data collected from participants during the study (as well as additional information regarding experimental conditions etc) were also stored on the server. At the end of the study, participants received a PayCode (a randomly generated alphanumeric string) which they were asked to enter into the text box on the Amazon Mechanical Turk (AMT) front.

Experiments were Python files run from a large EC2 Amazon Web Server. The se are generated by the python script and

### 2\_Videos

This folder contains all of the motion and caused change-of-state videos used in the experiment.

Each video is provided in three formats (.mp4, .ogv, & .webmsd.webm) to accommodate differences in media support across browsers/versions.



The following formats may also be present but they were not streamed (.mov & .avi and the output Adobe Flash Animation file .flv)

Videos are labeled in a systematic fashion. Video names are lowercase. The formats and examples are provided below.

**Motion events with instrumental manners-of-motion:** instrument.path.ground

Instrument (dot) path (dot) ground (dot) extension

*A girl hot-air balloons between hills*



*A man bikes down to the clown*



Regarding prepositions: *down*/*up* are used in place of *down to*/*up to*.

*front* is used in place of *in front of* and in some cases, *btw* is used instead of *between*

Regarding agents: each instrumental manners-of-motion is paired with an agent (e.g., a girl with black hair always travels by hot-air balloon, a blond boy always sails, an old man with white hair always flies the plane)

**Motion events with agentive manners-of-motion:** manner.path.ground

Manner-of-motion (dot) path (dot) ground (dot) extension

*A blue monster crabwalks down to an owl.*



**Change-of-state events (instrumental means):** instrument.effect.affectedObject

Instrument (dot) effect (dot) object (dot) extension

*A green monster uses a bat to break a record*



### 3\_Instrumental\_Motion\_Stimuli

This folder contains stimuli initially constructed for an eye-tracking experiment examining the flexibility of manner/path lexicalization biases.

#### Animations

The original flash files for instrumental motion events (.flv)

#### Illustrations

This folder contains the images drawn using Adobe Illustrator (.ai) by an outside consultant. These were used to create instrumental motion animations (Experiment 2). Many of these images were also used for agentive motion animations (Experiments 1 and 3).

## 3\_Code\_R

### DataProcessing

Scripts for pre-processing data that generate the files in [1.2\_dataMod](#_1.2_dataMod).



Scripts numbered “1” are for the initial merging of AMT with data generated by experimental script. Because the data is collected in Batches (different groups of subjects), this also amalgamates all data for each of the experiments with continuous subject numbers (so as to avoid duplicate subject ids).

There are 3 files because this data merging and re-numbering process references specific files and must be done separately to obtain initial data sets.

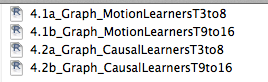


This script excludes participants who fail to meet demographic criteria or do not have a sufficient number of valid trials as well as invalid trials due to video streaming issues (see Paper for criteria). This script is also written in general terms and can be used to pre-process data from any of the experiments.

### Graphs

Scripts used to generate [1.3\_Graphs](#_1.3_Graphs) of lexicalization biases.

Note that the naming convention is consistent across graphs and the scripts that generate them. These scripts are valid for all 3 experiments.



### sAnalyses



This script is used for analyzing data for all three experiments. It computes lexicalization bias (scored as manner-of-motion or means preference depending on novel verb type) and test accuracy (learned target concept) from responses to bias1 and bias2 questions and test1 and test2 questions, respectively.

It also contains code for the analyses reported in the paper: effect of condition via 2-sample Wilcoxon rank sum tests and mixed-effects logistic regression with subjects and items as random effects; one-sample Wilcoxon rank sum tests comparing performance against chance – reliable bias/test accuracy?

There is also code for additional regressions with varying slopes etc. These were exploratory and not all of the code is well-defined.

1. See .csv files labeled by condition (e.g., “PathCondition\_DOsentences.csv” contains stimuli for participants in the path condition of Experiment 3 (where novel verbs appeared in DO frames).

   Path: ~/mTurk\_Run\_MannerResultExperiments\_Python\_HTML\_EC2/Manner\_Result/[condition]. [↑](#footnote-ref-1)