

This codebook.txt file was generated on January 7<sup>th</sup>, 2019 by Hannah Walter

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GENERAL INFORMATION  
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1. Title of Dataset

RV Atlantis - RV Atlantis- APAL Experiment 2019

2. Author Information

Principal Investigator Contact Information

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Institution: Illinois State University

Email: [jbwagma@ilstu.edu](mailto:jbwagma@ilstu.edu)

3. Date of data collection:

2017-06-16 to 2017-06-25

4. Geographic location of data collection:

The study was conducted during a 16-day cruise aboard the R/V Atlantis.

5. Information about funding sources that supported the collection of the data:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sector.

6. Demographic Summaries

1. N = 13, 4 females, 9 males
2. Average Age = 39.15
3. Average Height = 176.43 cm
4. Average Weight = 75.296 kgs
5. Average Years at Sea = 13.23 years

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SHARING/ACCESS INFORMATION  
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1. Licenses/restrictions placed on the data: CC0 1.0 Universal Public Domain Dedication, <http://creativecommons.org/publicdomain/zero/1.0/>
2. Links to publications that cite or use the data:  
Manuscript: Walter, H., Li, R., Wagman, J.B., Stoffregen, T.A., 2019. Adaptive perception of changes in affordances for walking on a ship at sea. Human Movement Science.
3. Links to other publicly accessible locations of the data: None
4. Links/relationships to ancillary data sets: None
5. Was data derived from another source? No
6. Recommended citation for the data:  
  
Walter, Hannah; Li, Ruixuan; Stoffregen, Thomas; Wagman, Jeffrey. (2019). RV Atlantis 2017 Ship Data. Retrieved from the Data Repository for the University of Minnesota, <https://doi.org/10.13020/1s80-qg61>.

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DATA & FILE OVERVIEW  
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1. File List
  - A. Filename: RV Atlantis\_APAL2017\_DATA  
Short description: Dataset of all collected data during the experiment. Includes calculations of performance, judgments, and accuracy.
  - B. Filename: RV Atlantis\_APAL2017\_DEMOGRAPHICS  
Short description: Demographics of participants utilized in this study.
  - C. Filename: June 16<sup>th</sup> 2017 Ship Motion Data  
Short description: Zipped folder of hourly data for the labeled date. Each file is raw data collected directly from the bridge of the R/V Atlantis.
  - D. Filename: June 25<sup>th</sup> 2017 Ship Motion Data  
Short description: Zipped folder of hourly data for the labeled date. Each file is raw data collected directly from the bridge of the R/V Atlantis.
2. Relationship between files:  
All files were created in relation to the 2017 APAL experiment conducted on the RV Atlantis.
3. Additional related data collected that was not included in the current data package: None

4. Are there multiple versions of the dataset? No

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METHODOLOGICAL INFORMATION  
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1. Description of methods used for collection/generation of data:

*2.3. Procedure*

Testing was conducted on the second deck of the ship, which was free from clutter (Figs. 2 and 3). Two pathways (each 8.9m long×0.3m wide) were created at 90° using clearly visible tape. One pathway was marked along the long (fore-aft) axis, and the other was marked along the short (athwart) axis (Figs. 3 and 4). Judgment data were collected with the participant standing at the intersection of the two pathways. At this starting location, participants stood with their feet on the taped lines. The purpose was to standardize foot position to reduce variation in the walking distance. The length and width of each path was the same used by Walter et al. (2017). We used a within-participants design, in which each individual participated on both days. The methods and procedure were identical on the two testing days.

*2.3.1. Familiarization phase*

Participants wore shoes in compliance with ship regulations. Beginning at the paths' intersection, participants were asked to walk comfortably along the marked paths while ignoring the lines: "Keep your eyes on the end line, ignore the parallel lines, and walk comfortably to the end line". Participants were required to walk out and back twice along each of the paths. The purpose of the familiarization phase was to ensure that participants were comfortable traversing the marked paths that we had created, *not* to provide practice at walking in different directions. Given that participants were experienced mariners and that the first day of data collection was the 5th day of the voyage (such that participants had already performed thousands of steps in multiple directions all over the ship, cf. Chang et al., 2015), it is unlikely that the familiarization phase provided (additional) information that participants used in making their judgments. Also, in the familiarization phase participants walked the full length of the paths without interruption, without any feedback about performance, and (on the first day of testing) without knowing that we were going to ask them to judge their ability to walk within the paths.

*2.3.2. Judgment task*

After familiarization, participants stood at the path intersection and estimated how far they could walk along each path without stepping on or over the marked lines. On each trial, the participant was asked to look at the designated path and estimate "if you were walking comfortably, how far do you think you could walk along this path without stepping on or over the lines?" To report estimated distance, the participant instructed an experimenter where to place a marker (a 0.25m length of a wooden 4×4) along the path. At the beginning of the trial, the experimenter stood near the participant, facing them, and slowly walked backward along the path until instructed to stop by the participant. Each participant gave two judgments for each path, for a total of four judgments. Across trials, judgments alternated between paths, with odd-number participants beginning with the fore-aft path, and even-numbered participants beginning with the athwart path.

*2.3.3. Performance (walking) task*

After completing the judgment task, participants were asked to walk comfortably along each of the paths: "Please do not look at your feet. Keep your eyes on the end of the path and walk so as to avoid stepping on the lines." Each participant completed a total of 12 trials, comprising three laps (out and back) along each path (originating from the intersection point), with each length constituting one performance trial. If the participant stepped on or over the lines with any part of either foot, it was classified as a "fault" and the walked distance was recorded from the spot of the fault (see supplementary materials). Each of three experimenters watched for faults, with one experimenter on each side, walking behind so as to be able to monitor footfalls, and so as to be outside the participant's field of view, and one experimenter remained at the starting point. Because ours was a field study in which the essential independent variable was a function

of sea conditions, it was not possible for us to counter-balance the order of presentation of the different ship motion conditions.

## 2. Methods for processing the data:

Recorded data was simply transferred from paper sheets utilized in the experiment to an excel file. Data were then analyzed via SPSS for ANOVAs. For each Ship Motion condition, we calculated means for the two judgments of the fore-aft path, and for the two judgments in the athwart path. We conducted a 2×2 repeated measures ANOVAs on these values with factors Ship Motion (Day 1: Pitch>Roll vs. Day 2: Roll>Pitch) and Walking Direction (Fore-aft vs. Athwart). To account for our use of a within-participants design, for statistically significant effects we estimated effect size using the  $F$ -value and its degrees of freedom (Lakens, 2013; Eq. (13)). Similarly, we computed effect sizes for post-hoc  $t$ -tests using Cohen's  $d_z$  (Lakens, 2013; Eq. (7)).

For performance trials, we took the mean of the six trials for the fore-aft path, and for the athwart path. We conducted 2×2 repeated measures ANOVAs with factors Days (Day 1 vs. Day 2) and Direction (fore-aft vs. athwart paths). The ANOVA revealed no significant effects. Despite this outcome, for comparison with Walter et al. (2017), we conducted planned comparisons of effects of walking direction on each testing day.

To evaluate the accuracy of judgments, we expressed judgments as a proportion of actual walking performance (judgment mean/performance mean). To determine whether accuracy varied as a function of conditions, we compared these proportions using a 2×2 ANOVA with factors Ship Motion (pitch>roll vs. roll>pitch) and Direction (fore-aft vs. athwart paths).

From raw data on ship motion, we computed the range of angular motion for each oscillation cycle. We used the *findpeaks* function in Matlab to identify the maximum excursion for each oscillation cycle, separately in pitch and roll. For each oscillation cycle, the difference between successive peaks was the range of motion for that cycle. We subjected these ranges to a 2×2 ANOVA with factors Days (Day 1 vs. Day 2) and Motion Direction (Pitch vs. Roll). In the ANOVA, the degrees of freedom reflect the number of oscillation cycles.

## 3. Instrument- or software-specific information needed to interpret the data:

From raw data on ship motion, we computed the range of angular motion for each oscillation cycle. We used the *findpeaks* function in Matlab to identify the maximum excursion for each oscillation cycle, separately in pitch and roll. For each oscillation cycle, the difference between successive peaks was the range of motion for that cycle. We subjected these ranges to a 2×2 ANOVA with factors Days (Day 1 vs. Day 2) and Motion Direction (Pitch vs. Roll). In the ANOVA, the degrees of freedom reflect the number of oscillation cycles

## 4. Standards and calibration information, if appropriate: None

## 5. Environmental/experimental conditions:

Testing was conducted on the second deck of the ship, which was free from clutter. Two pathways (each 8.9m long×0.3m wide) were created at 90° using clearly visible tape. One pathway was marked along the long (fore-aft) axis, and the other was marked along the short (athwart) axis.

On the first testing day, the ship maintained a constant heading NE, directly into a consistent 2m swell from the NE. The sea state was 2.5 on the Beaufort Scale (Beer, 1997). On the second testing day, the ship maintained a constant heading north, which put it at a constant angle relative to a 2m swell from the SW. The sea state was 4.0 on the Beaufort Scale.

## 6. Describe any quality-assurance procedures performed on the data:

To ensure a large enough sample size to provide sufficient power reliably to exclude false rejection of the null hypothesis, we tested power (1-β) with the G\*Power program (Faul, Erdfelder, Lang, & Buchner, 2007), using the *a priori* option and the effect size (0.81) for affordance judgments from Walter et al. (2017;  $n=16$ ). Power analysis revealed a test power of 0.967 and suggested that a sample size of  $n=10$

would be sufficient to achieve the desired effect size of 0.81.

Data were reviewed by each researcher aboard the RV Atlantis at the end of each day. Analyses were also reviewed by each researcher to prevent error.

7. People involved with sample collection, processing, analysis and/or submission:

Hannah Walter, Ruixuan Li, and Thomas Stoffregen participated in data collection, processing, analysis and submission. Jeffrey Wagman participated in analysis and submission.

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DATA-SPECIFIC INFORMATION FOR: RV Atlantis\_APAL2017\_DATA  
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TABS: "Day 1" & "Day 4"

1. Number of variables: 20

2. Number of cases/rows: 13

3. Missing data codes: None

4. Variable List

1. Name: Subj. #

a. Description: Subject Number

2. Name: Athwart-Path Width

a. Description: Subject's estimate of the path's width in centimeters.

3. Name: Foreaft-Path Width

a. Description: Subject's estimate of the path's width in centimeters.

"Judgment Trials (cm)"

4. Name: Foreaft 1

a. Description: First estimated judgment of their future performance by subject in the foreaft direction.

5. Name: Athwart 1

a. Description: First estimated judgment of their future performance by subject in the athwart direction.

6. Name: Foreaft 2

a. Description: Second estimated judgment of their future performance by subject in the foreaft direction.

7. Name: Athwart 2

a. Description: Second estimated judgment of their future performance by subject in the athwart direction.

"Performance Trials (cm)"

8. Name: Athwart 1

a. Description: First performance completed by subject in the athwart direction.

9. Name: Athwart

a. Description: Second performance completed by subject in the athwart direction.

10. Name: Foreaft 1
  - a. Description: First performance completed by subject in the foreaft direction..
11. Name: Foreaft 2
  - a. Description: Second performance completed by subject in the foreaft direction.
12. Name: Athwart 3
  - a. Description: Third performance completed by subject in the athwart direction.
13. Name: Athwart 4
  - a. Description: Fourth performance completed by subject in the athwart direction.
14. Name: Foreaft 3
  - a. Description: Third performance completed by subject in the foreaft direction.
15. Name: Foreaft 4
  - a. Description: Fourth performance completed by subject in the foreaft direction.
16. Name: Athwart 5
  - a. Description: Fifth performance completed by subject in the athwart direction.
17. Name: Athwart 6
  - a. Description: Sixth performance completed by subject in the athwart direction.
18. Name: Foreaft 5
  - a. Description: Fifth performance completed by subject in the foreaft direction.
19. Name: Foreaft 6
  - a. Description: Sixth performance completed by subject in the foreaft direction.

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DATA-SPECIFIC INFORMATION FOR: RV Atlantis\_APAL2017\_DATA  
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TABS: "Day 1 Analyses" & "Day 4 Analyses"

1. Number of variables: 8

2. Number of cases/rows: 13

3. Missing data codes: None

4. Variable List:

1. Name: Subj. #
  - a. Description: Subject Number

"Means of the trials by participant (expressed in cm)"

2. Name: Foreaft Judgment Means
  - a. Description: The mean of both of the subject's judgments of their most likely performance in the foreaft direction, in centimeters.
3. Name: Athwart Judgment Means
  - a. Description: The mean of both of the subject's judgments of their most likely performance in the athwart direction, in centimeters.

4. Name: Foreaft Performance Means

- a. Description: The mean of all six of the subject's performances in the foreaft direction, in centimeters.

5. Name: Athwart Performance Means

- a. Description: The mean of all six of the subject's performances in the athwart direction, in centimeters.

“Accuracy of the trials (Judgments divided by Performance, expressed as a percentage)”

6. Name: Subj. #

- a. Description: Subject Number

7. Name: Foreaft %

- a. Description: The outcome of dividing the subject's foreaft judgment mean by their foreaft performance mean. Expressed as a percentage.

8. Name: Athwart %

- a. Description: The outcome of dividing the subject's athwart judgment mean by their athwart performance mean. Expressed as a percentage.

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DATA-SPECIFIC INFORMATION FOR: RV Atlantis\_APAL2017\_DEMOGRAPHICS  
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TABS: “Demographics”

1. Number of variables: 8

2. Number of cases/rows: 13

3. Missing data codes: None

4. Variable List:

1. Name: Subj. #

- a. Description: Subject Number

2. Name: Age

- a. Description: Age of each subject

3. Name: Height (inches)

- a. Description: Height of each subject. Provided verbally by subject.

4. Name: Height (cm)

- a. Description: Height (inches) calculated in centimeters.

5. Name: Weight (lbs)

- a. Description: Weight of each subject. Provided verbally by subject.

6. Name: Weight (Kgs)

- a. Description: Weight (lbs) calculated in kilograms.

7. Name: Sex (0=male, 1=female)

- a. Description: Sex of each subject. 0=male, 1=female

8. Name: Years at sea

- a. Description: Years that each subject has spent working at sea, in any capacity.