Arizona State University
Narrative Networks (N2) – Phase I
Progress, Status and Management Report
Quarterly Progress Report

Period Covered by the Report
April 1, 2013 through June 30, 2013

Date of Report: July 12, 2013

Project Title: Toward Narrative Disruptors and Inductors: Mapping the Narrative Comprehension Network and its Persuasive Effects
Contract/Grant Number: D12AP00074
Total Dollar Value: $6,235,816.00
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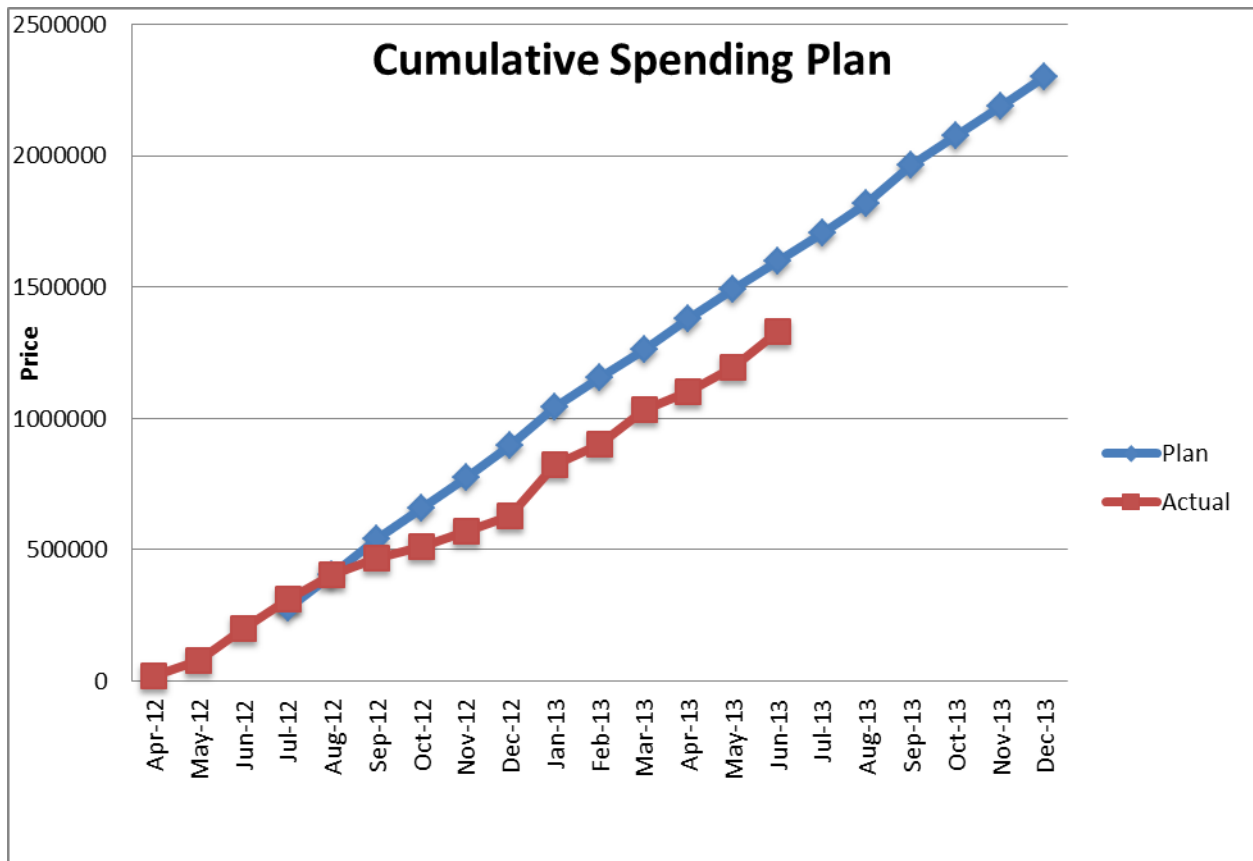Melissa McAbee, Melissa_M_McAbee@nbc.gov
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Technical Information – Financial Management

1. **Technical Progress / Quarterly Expenditure Report (Please provide cumulative spending graph).**

   Figure 1. Cumulative Spending Plan

Please provide April to June 2013 schedule of tasks and events for this report period, with financial expenditures broken down by task.

Task 1.1 – Startup task $36,735.70
Task 1.2 – Narrative Stimuli $49,781.93
Task 1.3 – Persuasion Protocol $66,268.13
Task 1.4 – Multi-model imaging $80,355.92
Task 1.5 – Knowledge Capture and Write results $2,773.16
Task 1.6 – Progress report $26,046.62
Task 1.7 – Travel $35,665.86

Total expenditures for the reporting period - $297,627 (estimated)

Actual Cost versus Planned Costs

	Current Cost ($)	*Total Phase 1 Cost ($)*
Plan	$335,002.00	$2,303,196
Actual	$296,669.08	$1,332,275
Difference	$38,332.92	$970,921

2. Technical Progress / Highlights – Observations

Overall Project

We met several important milestones in this reporting period. First, we completed final production on all the videos that will be used for stimulus materials. Second, we finalized the experimental design, adjusting it to account for time limitations imposed by the scanning environment. Third, we have developed all the software and procured the hardware necessary for effectively delivering the experimental paradigm in the scanner. Fourth, we ran a number of test subjects and demonstrated that the design produces brain responses in some of the areas anticipated in the original proposal. Fifth we have developed analysis algorithms for fMRI and EEG-fMRI data fusion that we expect to significantly speed data collection when the main neuroscience data comes in. Sixth we completed design of the out-of-scanner persuasion experiments, got those programmed into presentation software, and made good headway on a plan for recruiting subjects, which we expect to begin testing early next reporting period. One area of concern is that we continue to have difficulty properly removing fMRI and balistocardiogram artifacts from the EEG data. We are working with the manufacturer to resolve these problems so we can collect scanner data as scheduled in the next reporting period.

Narrative Team

During this reporting period, the narrative team completed one of its major deliverables (stimuli videos), continued progress on the articulation of communication theory under empirical validation in our project, and disseminated information about our project to the scholarly community. Specifically, all 18 stimuli videos (6 affiliated with Christian master narratives, 6 affiliated with Muslim master narratives, 6 without any master narrative affiliation) were fine-tuned for the scanner environment. Audio levels were adjusted to minimize any comprehension problems due to scanner noise environment, and the Neuroscience Team reports the new audio levels are acceptable. Further, file formats and file sizes were adjusted to ensure compatibility with scanner video display and data collection equipment.

In preparation for the International Society for the Study of Narrative Conference, Dr. Ruston conducted additional research into the literature of cognitive narratology, identity, and the relationship between narrative and action. This research will contribute to the vertical integration theory paper currently being authored by Dr. Corman, Dr. Ruston and Research Assistant Kristin Fleischer.

Narrative Team Leader Dr. Ruston traveled to Manchester, UK June 27-30 to attend "Narrative 2013" the annual conference of the International Society for the Study of

Narrative. Dr. Ruston was assigned to a panel entitled "Narrative Minds, Narrative Worlds" and provided the attending delegates with an overview of the experimental design, a discussion of the relationship of vertical integration to contemporary narrative theory, and preliminary neuro-imaging results. The paper was well received and generated questions primarily about venues for the application of this research, especially with regard to the growing field of narrative medicine.

Neuroscience Team
This quarter the Neuroscience Team began analyzing the pilot data using fMRI and EEG as well as combining the two methods. To date, we have acquired data from 8 participants in our vertical integration paradigm. Thus far, we have not encountered any health or significant comfort complications in acquiring simultaneous EEG/fMRI data. We previously had issues getting subjects to hear all the dialogue in the videos. That has been resolved with a set of ear-bud style MRI compatible headphones.

Dr. Corman traveled to Hamburg to present preliminary results of the Story Memory study at the International Sunbelt Social Networks Conference. These are described below under "Results or Problems and Solutions." Dr. Corman, Brewer, and Cohen traveled to London to present a briefing about the project to a Communication Science preconference at the International Communication Association convention. The project was well received and useful contacts were made with others working in this space, including a team at the University of California at Santa Barbara.

Our Assistant Research Faculty, Zhen Yuan, was able to successfully implement and document all of his algorithms for simultaneous fMRI/EEG analysis. We have also developed a technique to use the Narrative team's coding of the videos to ensure that we avoid a fishing expedition when identifying linearly independent components.

Finally, the Neuropsychology Team has added a new graduate student, Justin Fine, M.A. Justin is an ASU graduate student with possesses expertise in MATLAB as well as mathematical modeling. He is working with Chris on organizing the data preprocessing and analysis stream. We have also added a new undergraduate research assistant, Jordan Hibbs, to take over Kim's administrative duties, freeing Kim to devote her time on the project to tasks that require her expertise with the EGI software interface.

Subjects Team
As mentioned in our prior report, we have obtained all necessary IRB approvals. For the out of scanner experiments (focus groups, quantitative evaluation of videos, and persuasion experiments), we have received ASU approval (via the exempt mechanism), and successful second-level review from USAMRMC. For the scanner (EEG & fMRI) experiments, we received approval from ASU and Barrow (both via the expedited mechanism), and again successfully obtained second-level review from USMRMC.

Our behavioral experiments are completely programmed in Qualtrics and we have set up Mturk to begin prescreening 4000 people to get our required numbers, and we have set up the ability to link the main experiment (time 2 questionnaire) to the baseline (time one)

questionnaire. This is being launched the week of 8 July. Simultaneously, we are inquiring with Qualtrics about whether they can assemble a panel of Christians, Hindus, and Muslims.

Persuasion Team

The persuasion team regularly attended and actively participated in all full team, human subjects team, and the narrative team meetings to refine and improve our project. The lead of the persuasion teem also attended the PI meeting in May, 2013. The persuasion team spent considerable time learning about the Amazon.com's Mechanical Turk (mTurk) system, which will be used to recruit participants for the out-of-the scanner study, and forwarded what was learned to the human subjects in an effort to help expedite their recruitment efforts. The persuasion team spent considerable time setting up the entire outside-the scanner-study in Qualtrics so it is ready to go as soon as the human subjects team is able to recruit participants. Part 1 is a screening survey which, amongst other things, contains a pretest for the key persuasion dependent measures (i.e., attitudes and behavior). Part 2 is the main study which includes, amongst other things, showing all 12 of the selected videos, the imagery manipulation, and measuring three key dependent variables (i.e., posttests for attitudes and behavior, plus transportation and memory). Both parts of this study were substantial undertakings given the number of videos and items, and the amount of complex / multi-level randomization involved. Finally, the persuasion team began setting up additional follow-up studies in Qualtrics. One of these studies will mirror the main study except using just six videos rather than all 12, which will serve as a backup in case the demand characteristics of the main study negatively impact results. The other study will be a between-subjects study where, amongst other things, participants will watch a single pair of videos (for example, the two organ donation videos) before completing the dependent measures. Our current plan is to screen 4,000 individuals in Part 1, and have 300 of these individuals (100 Christians, 100 Muslims, and 100 Hindus) complete Part 2. Further, any eligible participants who exceed the number of participants needed for Part 2 will be funneled to one of the two follow-up studies.

3. **Results or Problems and Solutions**

Narrative Team

No significant problems are anticipated for the Narrative Team. One of the anticipated accomplishments for completion during FY13 Q3 (Apr-Jun) was a short essay on the application of vertical integration, narrative validity and narrative arcs suitable for a military/practitioner audience. Independently of this N2 project, Dr. Ruston has been accepted for enrollment in the Joint Forces Staff College's Join Information Operations Planners Course (JIOPC). This opportunity will provide valuable insight into the planning process and how academic theories of narrative and persuasion can be integrated. Thus, the anticipated completion date has been postponed to late in FY13 Q4.

Neuroscience Team

As mentioned above the team has preliminary results for our Story Memory experiment. The study tested whether "induced paths" in semantic networks induce false memories about stories in subject who read them, in accordance with activation/monitoring theory. The study tests for this using the Deese-Roediger-McDermott (DRM) paradigm by presenting subjects with "true" sentences derived from semantic graphs representing stories, "induced" sentences derived from the graphs by not appearing in the story, and "synthesized" sentences made

from nodes in the story graphs that are not connected.   This was tested using a 2 x 2 x 2 experimental design manipulating sentence type, test-type (immediate vs. delayed testing), and aggregation (graphs derived from single vs. multiple stories). Subjects were presented with the sentences and asked to judge them "old" (occurring in the story they had read) or "new" (not occurring in the story). Preliminary results show effects for test type, aggregation, and sentence type. The slides from the conference presentation are included with this report.

The team has worked on handling the previous problems highlighted in the previous report. Specifically: we have reduced the number of videos that participants watch by a third without significantly reducing power and we have developed a template for data preprocessing to ensure that our data is cleaned effectively and quickly so that it can be processed using the scripts developed by our bioengineer, Zhen Yuan.

We have run into a new problem, however. We have been unable to entirely remove the MR gradient from the EEG data. This makes it impossible to model the heartbeat which we need to remove the ballistocardiogram from the EEG signal. Our graduate student, Kim Talboom, is working with the engineers at EGI who are "committed to helping us resolve this issue". However, until we are confident that we can clean the MRI artifacts from the EEG data, we have decided to suspend data collection until this issue can be resolved. We have made progress towards this (have been able to remove most of the gradient artifact), but with no "baseline" to compare it to, we have had to run additional pilot subjects in an established task to assess the success of this. So, although we anticipated scheduling difficulties at Barrow Neurological Institute for the summer, they haven't impacted us. Nonetheless, we have developed an organizational chart (scheduled by our new laboratory manager, Jordan Hibbs) that will ensure two fully trained research assistants are ready to collect data at a moment's notice.

To end on a high note, all of Zhen's algorithms have been implemented and documented. Zhen has also committed to be available to troubleshoot any unforeseen issues that may arise.

Subjects Team
We have created a prescreening questionnaire for subject recruitment which assays participants' cultural, demographic, and religious backgrounds, and their suitability for scanning experiments (viz. any medical condition or issue which would preclude safe scanning, handedness, etc.). We also measure English fluency.

We have advertised this to Psychology 101 students, calling and emailing all Christians, Hindus, and Muslims; and done similarly with relevant campus and community religious organizations. On 10 April, Dr. Cohen made a similar announcement to the psychology research pool at ASU Polytechnic's campus, which has a greater representation of minority religious communities. We will do all of these again come the fall semester. Following is a summary of our recruitment progress for our scanner studies:

	Christian	Hindu	Muslim
Total taken prescreening survey	120	51	22
Definitely MRI qualified	70	43	14
Not MRI qualified	41	6	7
Questionable qualification (need follow up by Dr. Baxter)	9	2	1
Matched with subjects in other religious groups	20	20	13 (7 F, 6 M)

Persuasion Team

Persuasion Team Problems and Solution 1: It took significant effort learn about the mTurk system. But, after reading a considerable amount of documentation and contacting mTurk support multiple times, we believe we have a basic understanding of the necessary procedures. This information was turned over to the human subjects team, who will learn more about mTurk, set up the mTurk system, and recruit participants for the persuasion study.

Persuasion Team Problem and Solution 2: It was challenging learning how to do all the randomization in Qualtrics. Randomizing along single criteria is fairly easy, but randomizing across multiple criteria and between multiple sections proved difficult. But, we are happy to report that we finally worked everything out and that the main study is ready to go. We expect to begin collecting data early next quarter.

4. **Significant Accomplishments Anticipated During Next Reporting Period**

Narrative Team.
- Archive all video production materials (images, audio tracks, video files, etc.) in consistent file formats to facilitate future editing and transformation for Phase II.
- Complete a theoretical paper on vertical integration suitable for submission to an accredited and peer-reviewed academic journal in the field of communication.
- Leverage experience from exposure to military information operations process training to write an essay targeted at a military/practitioner audience on the application of vertical integration, narrative arcs, and coherence and fidelity in information operations and strategic communication.

Neuroscience Team
- Finish data collection
- Complete data preprocessing and analysis
- Be in the middle stages of data interpretation
- Commence writing journal articles
- Planning for potential problems

Subjects Team
- Successful recruitment for scanning 20 Christians, 20 Hindus, and 20 Muslims for Phase 1. We are there for the Christians and Hindus but we still need 4 more Muslim males and 3 more Muslim females for the scanner. We will keep up our recruiting efforts. One Muslim participant was run as a pilot subject, so we have 13 looking forward.
- Successful recruitment for the out of scanner experiments for Phase 1: 60 Christians, 60 Hindus, and 60 Muslims.

Persuasion Team
- Complete programming of two follow-up persuasion studies. We have the basic designs worked out, now know how to do all of the programming, and have the shell of these studies programmed. We anticipate finishing programming in July 2013 so we can direct any overflow from the main study to these studies once participants become available.
- Complete data collection for the main outside-the-scanner study (assuming the human subjects team is able to recruit participants).
- Conduct preliminary data analysis of the main study data on the full sample if possible, or on a partial sample if necessary (again, assuming the human subjects team is able to recruit participants).

5. Publications (relevant effort)

- There have been no relevant publications during the reporting period.

6. Meetings and Events (please include meetings with subcontractors if applicable)

- We have had weekly meetings with Leslie Baxter at Barrow Neurological Institute

- We have had weekly all-hands, and team meetings.

- Narrative Team Leader Dr. Ruston traveled to Manchester, UK June 27-30 to attend "Narrative 2013" the annual conference of the International Society for the Study of Narrative. Dr. Ruston was assigned to a panel entitled "Narrative Minds, Narrative Worlds" and provided the attending delegates with an overview of the experimental design, a discussion of the relationship of vertical integration to contemporary narrative theory, and preliminary neuro-imaging results. The paper was well received and generated questions primarily about venues for the application of this research, especially with regard to the growing field of narrative medicine.

- Dr. Corman traveled to Hamburg to present preliminary results of the Story Memory study at the International Sunbelt Social Networks Conference. These were described above under "Results or Problems and Solutions."

- Drs. Corman, Brewer, and Cohen traveled to London to present a briefing about the project to a Communication Science preconference at the International Communication Association convention. The project was well received and useful contacts were made with others working in this space, including a team at the University of California at Santa Barbara. We have been invited to present our project there in the Fall, and also at the University of Southern California Annenberg School for Communication.

7. Other

- We are continuing discussions with the MIT team about getting the Phase I videos coded in Story Workbench (SW). The issue at hand is how to render events in a video in text in an objective way to allow coding in SW. This is challenging because some narrative material in a video is presented in exclusively visual form, so there is a question of how to objectively link these events to text descriptions.

- We are making arrangements to share our videos with the CRA team. In exchange, they will provide us with physiological data measured from subjects watching the videos for possible use in our own data analysis.