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University of Oregon McNair Scholars Program Research Journal

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Susan Lesyk, Director, Teaching and Learning Center
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**University of Oregon
McNair Scholars Program
Research Journal**

2016

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**Contextual Modulation:
Components of the Rod-and-Frame Illusion
and the Systemizing Trait of Autism**

David Adams

Psychology, Biology, Honors College

Mentor: Paul Dassonville
Psychology

A vertical line surrounded by a tilted frame is typically perceived as being tilted in the opposite direction. This rod-and-frame illusion is thought to be driven by two distinct mechanisms. Large frames cause a distortion of the egocentric reference frame (a visuovestibular effect), but small frames are thought to elicit the illusion through local-contrast effects within early visual processing. Past work has found that an intact frame was not necessary to induce the illusory visuovestibular effect. However, it remains unclear if the same is true for the local contrast effects caused by small frames. Participants performed a perceptual task in which they reported the orientation of a target line presented in the context of an intact tilted frame or a partial frame (flankers consisting of either the top/bottom or the left/right sides of the frame). Significant contrast effects occurred for all stimulus conditions, with the effect of the top/bottom flankers substantially larger than that of the left/right flankers. The effect of the top/bottom flankers even surpassed that of the intact frame. These findings suggest an underadditivity of the cellular mechanisms responsible for the contextual effects of lateral and collinear flankers.

A Diverse Look at Switch Rate and Task Switching

Dagger Anderson

Psychology

Mentor: Ulrich Mayr

Psychology

Mentor: Jason Hubbard

Psychology

A common method to assess executive control is the task-switching paradigm. It is well known that reaction times are larger when subjects switch tasks compared to when the same task is performed over consecutive trials. This reduction in performance when flexibility is required is known as a switch cost. It is not well understood how switch costs are influenced by a rapidly changing environment that sometimes demands more flexibility (i.e., more switching) and other times requires more stability and resistance to distracting information. Prior research using between-subjects designs suggests that people can indeed shift between a more flexible or stable state depending on switch rate (Mayr et al., 2012). Unlike previous research, the current paper investigates how low and high switch rate conditions influence the tendency to adopt a flexible or stable state as a within-subject manipulation. Results using a sample of college students indicate that people can quickly adapt their behavior to meet the demands of both flexibility and stability.

Pheromones and Path Selection of *Atta cephalotes*

Joshua Coon

Biology

Mentor: Robert Schofield

Physics

Atta cephalotes has been studied widely for its use of pheromones to determine the choice of foraging trails, but there is a lack of research focusing on energetically successful trail choice. According to the current methodology, once a trail is established there is no way for a new trail to become established, even if it is energetically advantageous. I propose that pheromones play a role in controlling the preference for a foraging trail that is shorter and consumes less energy. To test that idea, I will look for differences in leaf carrying and non-leaf carrying ants when given a new path to walk along. Teflon tubing provides a way to collect the pheromones laid down by each group of ants in two separate scenarios. The samples will then be analyzed with a coupled gas chromatographer and mass spectrometer (GC-MS) using a split method.

Maternal Betrayal Trauma and Response to Adolescent Negative Emotion: Does Maternal Emotion Regulation Matter?

Zachary Cunningham

Psychology

Mentor: Jennifer Freyd

Psychology

Mentor: Christina Gamache Martin

Psychology

Maltreatment and other distressing experiences are quite common in childhood. Parental reactions to childhood trauma are especially important because they occur during a time when parents are engaged in the process of emotion socialization with their child. The current study investigated the role of maternal emotion regulation as a moderator between maternal trauma history and invalidation of teen negative emotion, an area with little prior investigation. Participant data were acquired from ongoing research involving mother and teen dyad disclosures at the University of Oregon. Participant responses to a series of three questionnaires covering child negative emotion, emotion regulation, and betrayal trauma history were recorded and analyzed to determine if maternal emotion regulation acts as a moderator in the relationship between maternal trauma history and invalidation of teen negative emotion.

Where There's Smoke, There's Fire: PM2.5, Forest Fires, and Hospital Admissions in Oregon

Matthew Dodier

Economics

Mentor: Benjamin Hansen

Economics

In the past few decades, economists have improved the analysis of air pollution and its health impacts as described in epidemiology literature by utilizing quasi-experimental techniques such as instrumental variables (IV), natural experiments, and difference-in-differences models. However, much of the economic literature exploring the health impacts of outdoor air pollution has focused on more populated states, such as California and Texas, and consequently lacks external validity for many regions of the United States. To help fill that gap, I analyzed particulate pollution in the state of Oregon from 2008–2014. This paper studies the relationship between particulate pollution and hospital admissions. I examined whether higher levels of particulate pollution have a causal impact on hospitalization rates for respiratory and circulatory diagnoses in Oregon. To do this, I use forest fires as a natural experiment to estimate the implied effect of particulate matter less than 2.5 microns in diameter (PM2.5) on hospital admissions rates for respiratory and circulatory illnesses.

**Proton Exchange Rates on
Hydroxide Bridges of the Mineral-Like
 $\text{Ga}_{13}(\mu_3\text{-OH})_6(\mu_2\text{-OH})_{18}(\text{H}_2\text{O})_{24}(\text{NO}_3)_{15}$ Cluster**

Caitlyn Fields

Biochemistry

Mentor: Darren W. Johnson

Chemistry, Biochemistry

Mentor: Anna Oliveri

Chemistry, UC Davis

Mentor: William H. Casey

Chemistry, UC Davis

Soluble metal-hydroxide clusters of Group 13 metals are popular in both materials chemistry and geochemistry. In geochemistry these clusters are used as experimental models for clay-like minerals. In materials chemistry these clusters are the precursors for useful thin films. However, little is known about the kinetics, formation mechanisms, and solution dynamics of these species or how these processes compare to monomer ions. In this study we use ^1H -NMR spectroscopy to estimate the exchange rates of protons on sites in the $\text{Ga}_{13}(\mu_3\text{-OH})_6(\mu_2\text{-OH})_{18}(\text{H}_2\text{O})_{24}(\text{NO}_3)_{15}$ (**Ga₁₃**) and $\text{Ga}_7\text{In}_6(\mu_3\text{-OH})_6(\mu_2\text{-OH})_{18}(\text{H}_2\text{O})_{24}(\text{NO}_3)_{15}$ (**Ga₇In₆**) cluster species.

The Neurotoxic Effects of Amyloid-Beta Oligomers in *C. elegans*

Robel Haile

Human Physiology

Mentor: Janis Weeks

Biology, Institute of Neuroscience

Mentor: Kristin Robinson

Institute of Neuroscience

Alzheimer's disease (AD) is one of the most common neurodegenerative disorders causing dementia in the aged population. Clinically, AD strips patients of memories and cognitive performance, while pathologically it results in deposits of toxic amyloid-beta ($A\beta_{1-42}$) oligomers and neurofibrillary tangles of tau protein in the brain (Dosanjha et al., 2010). The existing treatments for AD have limited effectiveness, a fact that makes it vital to accelerate the search for new therapeutic compounds. Accordingly, it may be productive to target $A\beta_{1-42}$ oligomers when searching for new therapeutic drugs for AD. Preliminary experiments have shown that feeding $A\beta_{1-42}$ oligomers to *Caenorhabditis elegans* can inhibit the nematode's normal pharyngeal pumping rate. This project has three goals: (1) to replicate the toxic effect of $A\beta_{1-42}$ oligomers using visual pharyngeal pump counts, (2) to implement a microfluidic electropharyngeogram platform to obtain more quantitative and sensitive data, and (3) to test for protective effects of EGCG and isradipine against $A\beta_{1-42}$ toxicity.

Malcolm X and Martin Luther King Jr.: The Vanishing Point of Two Black Streams of Consciousness

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Ethnic Studies, History

Mentor: Michael Hames García
Ethnic Studies

The principle objective of this research is to contribute to a critical body of work by recent scholars who have challenged the popular understanding and the perceived differences of both Dr. Martin Luther King Jr. and Minister Malcolm X. Scholarship has not yet adequately compared and contrasted the political messages and insights that each leader presented in the final years of his life. This research engages with Malcolm X's and MLK's later works, which were critical for understanding new developments in their political messages and strategies. In order to comprehend the final years of both leaders, this paper will use a close reading of primary and secondary sources to provide a comparative analysis of their work. Also, the paper seeks to explore the commonalities and divergent strategies that MLK and Malcolm X used in their final messages and suggests ways that these messages are still relevant to US society.

**The Genetic Architecture Underlying
Biting in the Pitcher-Plant
Mosquito, *Wyeomyia smithii***

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Mentor: William Bradshaw

Biology, Institute of Ecology and Evolution

Mentor: Christina Holzapfel

Biology, Institute of Ecology and Evolution

Mentor: Rudy Borowczak

Biology, Institute of Ecology and Evolution

By taking multiple blood meals, a female mosquito becomes an ideal vector for transmitting blood-borne diseases. To better combat disease transmission by mosquito vectors, this research used quantitative genetics to investigate the genetic interactions underlying the biting trait. We generated line crosses between an obligately nonbiting population and a biting population of *Wyeomyia smithii* and assayed the crosses for biting. The biting propensity for each cross was determined based on the number of biting females and the total number of females. The propensities were then compared to determine the role of additivity, dominance and epistasis on the genetic components underlying biting.

Shifting Racial and Ethnic Identities Among Guatemalan Immigrants

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Ethnic Studies, Anthropology, Spanish

Mentor: Lynn Stephen

Anthropology, Center for Latino/a and
Latin American Studies (CLLAS)

This research explores the interaction between racial and ethnic identity formations that socialized Guatemalans in their country of origin and the process of becoming re-racialized and socially labeled in the United States, specifically as they live in Oregon. Earlier studies of ethnic identity have been narrow and tended to link ethnic group identification with ethnic identity while failing to recognize the wide variability existing within ethnic groups. In the last three decades, studies of ethnic identity have broadened to explore feelings of belonging as well as specific ethnic knowledge and behaviors, while other studies continue to focus on identification labels, self-identification and agency. My research seeks to illuminate the structural racial formations in Guatemala and the US, analyze individual understandings of racial and ethnic identities, and determine whether they have shifted because of migration or place of settlement. To accomplish these tasks, I use data gathered from primary interviews with five Guatemala immigrants living in Oregon.

Food and Gardening: Benefits and Challenges for Latino/a Communities in Public Spaces

Tamara LeRoy
Anthropology

Mentor: Lynn Stephen
Anthropology, Center for Latino/a and
Latin American Studies (CLLAS)

This project explores how Latino gardeners in public, community-garden spaces use food, food production, and cooking in the public sphere to preserve and promote cultural and ethnic identity in a majority Anglo city. Ethnographic methods of participant observation and interviews may illuminate additional topics for exploration that relate to interactions between Latino and non-Latino gardeners. Such topics for further exploration include food autonomy, food security, diversity and inclusion for marginalized groups, and opportunities for improved communication and collaboration in venues shared by minority and majority groups. This research is grounded in recent theoretical discourse including decolonization and food sovereignty, two concepts that frame this research in the contemporary and local setting.

The Role of Self Doubt and Empathic Accuracy in STEM Fields

Kristina Lowney

Psychology

Sara Hodges, Psychology, Associate Dean of the Graduate School

Adrienne Wise, Psychology

Colton B. Christian, Psychology

In their daily interactions, people demonstrate varying levels of empathic accuracy, a construct that refers to one's ability to accurately infer the thoughts and feelings of others. This study examines whether feelings of self-doubt impact empathic accuracy, particularly in women, when they are interpreting feedback in STEM fields (science, technology, engineering, and mathematics). Women are underrepresented in the STEM fields as they choose not to continue their studies or not even pursue STEM fields at all. One reason for this trend might be attributed to how they interpret feedback in the domain. Seventy-two dyads composed of graduate and undergraduate students in STEM fields were recruited and scheduled to hold recorded conversations to discuss graduate school. Graduate students provided feedback to undergraduates interested in attending graduate school in a related field. Undergraduate students were asked to complete a questionnaire, part of which inquired about feelings of general self-doubt, and they were also asked to infer the graduate student's thoughts regarding the undergraduate's future prospects in graduate school. Results indicated that there was no significant difference between male and female undergraduates for self-doubt or empathic accuracy. These findings are considered in terms of other possible underlying factors contributing to women's underrepresentation in the STEM domains.

Sociability Gap between Chinese American Mothers and their Children: Consequences of the Gap for Young, School-Age Children's Adjustment

Christine Nguyen

Psychology

Mentor: Jeffrey Measelle

Psychology

Mentor: Jennifer Ablow

Psychology

Mentor: Xiaoning Sun

Psychology

A gap in sociability, a key element in adapting to any culture, has generally been overlooked in the current literature of the acculturation gap. This study explored the sociability gap and the degree to which such a gap constitutes risk for children in their early school years. Participants included 70 Chinese American mothers and their 5-7 year-old children. A standard residual and difference sociability gap score was generated from each child's and each mother's self-report on two dimensions: introversion/extraversion and social acceptance. This study examined the acculturation of the mothers as a predictor of the sociability gap. Children self-reported maladjustment, the dependent variable, along four dimensions: depression and over anxiousness, separation anxiety, antisocial behavior with peers, and social inhibition. Results indicated that mothers' acculturation was significantly negatively correlated with the mother-child sociability gap along the social acceptance dimension. That finding in turn was significantly negatively correlated with child depression and social inhibition.

Integrated Photonic Circuits

Brandon Riemer

Physics

Mentor: Benjamín Alemán

Physics

Photonics is a relatively young field. With many applications, including molecular sensors and quantum computers that are yet to be developed, photonics may have as significant an impact in the 21st century as electronics had in the 20th century. In this work, we propose to explore, engineer, design, and fabricate an integrated photonic circuit. The architecture of that circuit consists primarily of a fiber optic wave guide coupled with a mechanical oscillator. A fiber optic photoresist, SU8, will be deposited on a silicon nitride substrate and patterned to form the photonic circuit. A suspended structure, such as a cantilever, will be affixed to the edge of the substrate; the SU8 wave guide will be placed directly on top of the cantilever. This configuration of the wave guide and the cantilever will allow light from the wave guide to be emitted from the end of the cantilever. The light emission angle will carry information about vibrations (or static deflections) of the cantilever as a result of being driven and allow the effects caused by amplification of this light to be explored. These devices will enable novel actuation and sensing experiments, opening the door to real-time spectroscopy.

The Continuation of US Imperialism through Transnational Marriages between Pilipinas and US Men

Paulla Santos

History

Mentor: Julie Weise

History

This paper explores connections between marriages of Pilipinas and US men and the period of US imperialism during the late 19th century and the first half of the 20th century. Events, such as the US imperial government establishing a US-centric education system in the Philippines and the US-Philippine involvement in the Second World War, set the foundation of sexual and gendered stereotypes associated with Pilipinas and US men. These stereotypes consisted of Pilipinas being viewed as submissive, docile, and possessing western notions of traditional femininity and US men as powerful, wealthy, and dominant. These associations persisted throughout the 20th century with the assistance of the Military Bases Agreement of 1947, the Philippine presidencies of Ferdinand Marcos and Corazon Aquino, and the growth of correspondence relationships in the late 20th century. This paper examines the continuation of US imperialism through the representations of and interactions between Pilipinas and US men.

Pheromones and Path Selection of *Atta cephalotes*

Joshua Coon

Biology

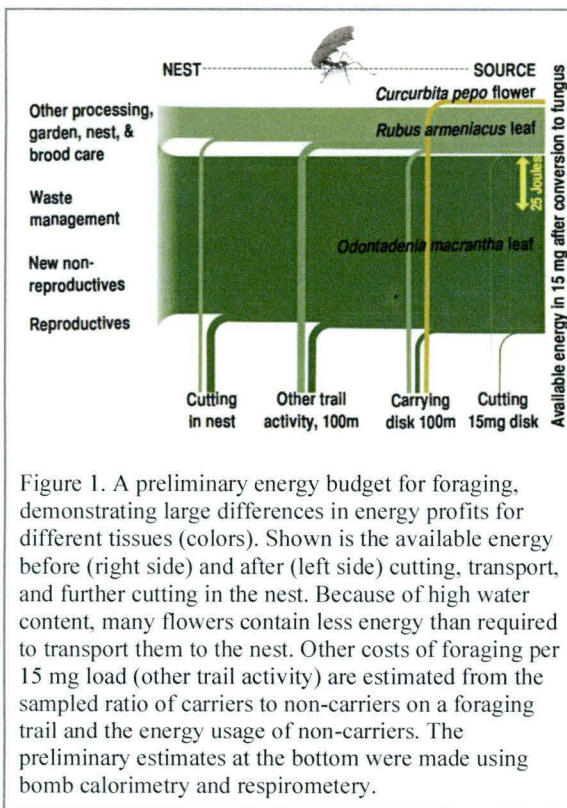
Mentor: Robert Schofield

Physics

Introduction

Researchers R. Beckers, J. Deneubourg, and S. Gross outlined the cur-

rent methodology focusing on path choice when they wrote: "If a mass forager arrives at a fork in a chemical recruitment trail, the probability that it takes the left branch is all the greater as there is more trail pheromones on it than the right one, adding more pheromones increasing the probability of the next forager to choose the left trail"¹². This methodology is troubling because it does not account for the energetics behind the day-to-day tasks of ants.



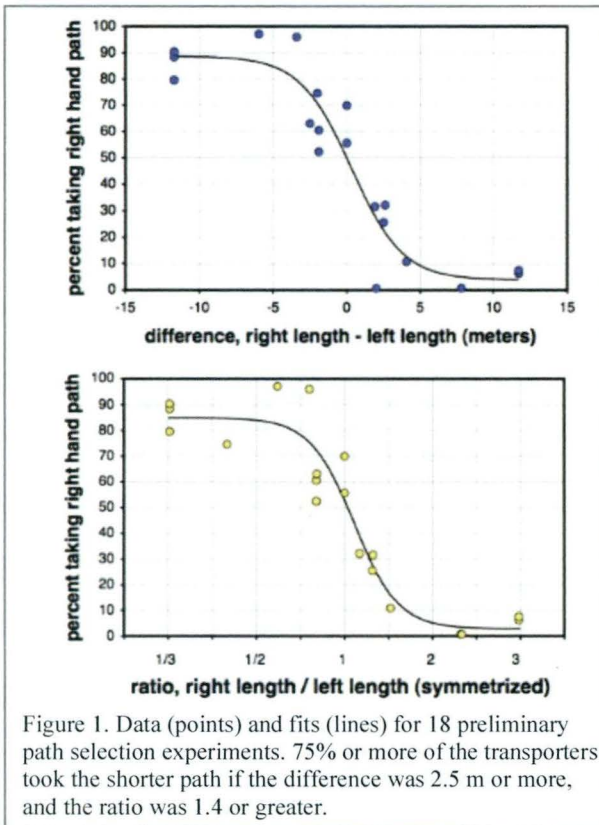


Figure 1. Data (points) and fits (lines) for 18 preliminary path selection experiments. 75% or more of the transporters took the shorter path if the difference was 2.5 m or more, and the ratio was 1.4 or greater.

Work in the Schofield lab at the University of Oregon (figures 1, 2) shows that ants can indeed choose a different path than the one with the largest quantity of pheromones and also have a multitude of tasks to accomplish for a successful colony to be productive and healthy. Figure 1 shows the usages of energy provided by three types of sources. The graph displays the amount of energy (joules/thickness of leaf section taken) re-

quired for each listed task. Figure 2 shows the path selection of ants during a timed trial with two sections of tube. As part of the trial, one section of tube was replaced by a section of shorter, clean tubing. As observed, the ants chose the path that was at least 2.5m shorter. In light of the newer work focused on energetics, the trials in the Schofield lab reveal that the ants do indeed choose a path that is shorter, or, in other words, the ants choose the more energy efficient path. According to the current and more traditional methodology, ants would be unable to switch to a shorter path, and the observations we have seen would be impossible. Based on observations in the lab, I propose that, instead of mass pheromonal control,

there is selective pheromonal control over the direction and path that the ants take and that choice depends on whether the ants are foraging (non-leaf carrying) or leaf carrying⁸.

Methods

Designing and building a structure that allows for the selection of an individual classification of ant (leaf carrying or non-leaf carrying) with simplicity^{5,10,9} is challenging because of the inherent nature of ants, which includes their always attempting to explore the surrounding area. The structures were mostly made of polycarbonate and other thick mendable plastics. Pieces were mended together using Methyl Ethyl Ketone (MEK), a common solvent. Three main pieces composed the track: separation chamber (A), collection chamber (B), and one-way chamber (C). A talc powder coated the sides of the chambers to restrict the ant flow to a linear motion and not allow them to roam off of the path. Along with the control



Figure 3A - Separation chamber allowing selection by category of ant.



Figure 3B: Teflon bridge and holding structure to maximize ants on bridge.



Figure 3C: One-way chamber control the direction of travel.

of the talc powder, double-sided tape was placed at the four legs of the table and along the secondary containment chamber to insure that the ants were unable to completely escape even if a breakout occurred.

Collection

The selection and collection of the pheromones followed two scenarios: ants carrying leaves and ants not carrying leaves. To accomplish this selection, the separation chamber was set at a height that allowed the use of insect forceps to pick out ants that were carrying leaves, thus selecting for ants that were not carrying leaves. The procedure was reversed to select for ants carrying leaves so that ants not carrying leaves were removed. A piece of plastic in the separation chamber converted the chamber into a very tight hallway that did not allow the ants carrying leaves to pass through. Once the target ants were selected, they walked through to the collection chamber that houses the Teflon half pipe. The ants walked across the half pipe for two hours depositing their pheromones. Teflon, because of its chemical properties that make it resistant to chemical attack, is easy to rinse with a solvent to clean the deposited chemical. The washing of the half pipe was conducted using HPLC grade hexanes, setting the half pipe to a steep angle and running approximately 1.5ml of the hexane down the half pipe twice. Once the wash had been completed, the collected solvent was extracted from the container using a 1ml syringe and filtered into a GC-vial using a 0.2 μ m PTFE filter. One important feature of the experiment are the two different Teflon half pipes that were used during the trials. The whole apparatus was set up 24 hours prior to the collection using an "acclimation" half pipe; letting this time pass ensured a good quantity of traffic over the bridge. Once the run was initiated, the acclimation half pipe was switched with the "collection" half pipe. Once the pipes were switched, the selection process began, and the ants ran along the Teflon bridge for a minimum of two hours.

Characterization

Once the solvent containing pheromones had been filtered properly, it was run on a GC-MS^{1,4,9,6} with the assistance of Daniel Seidenkranz. The following section is the method of treatment for each vial containing the solvent and analyte.

Pre-run Program	Initial Settings	GC Program	MS Table
Number of Rinses with Pre-solvent: 2	Column Oven Temp.: 70.0 °C	Ion Source Temp: 200.00 °C	Start Time: 3.00min
Number of Rinses with Solvent (post): 2	Injection Temp.: 275.0°C	Interface Temp.: 275.00 °C	End Time: 22.23min
Number of Rinses with Sample: 2	Injection Mode: Split	Solvent Cut Time :2.50 min	ACQ Mode: Scan Event Time: 0.30sec
Plunger Speed (Suction): High	Flow Control Mode: Pressure	Detector Gain Mode: Relative to the Tuning Result	Scan Speed: 1666
Viscosity Comp. Time: 0.2 sec	Pressure: 100.0 kPa	Detector Gain: 0.88 kV +0.00 kV	Start m/z: 35.00
Plunger Speed(Injection): High	Total Flow: 52.0 mL/min	Threshold: 0	End m/z: 500.00
Syringe Insertion Speed: High	Column Flow: 1.53 mL/min		
Injection Mode: Normal	Linear Velocity: 45.4 cm/sec		
Pumping Times: 5, Inj.	Purge Flow: 3.0 mL/min		
Port Dwell Time: 0.3 sec	Split Ratio: -1.0		
Terminal Air Gap: No			
Plunger Washing Speed: High			
Washing Volume: 8uL			
Total time: 22.33 min.			

Results

For control using the GCMS, a sample of pure hexanes HPLC was run through clean Teflon halfpipe and filtered through a Teflon filter in order to get a baseline of the peaks that may occur from backline pollution. Graphs A-J (Figure 4) were obtained using the methods outlined above. The re-

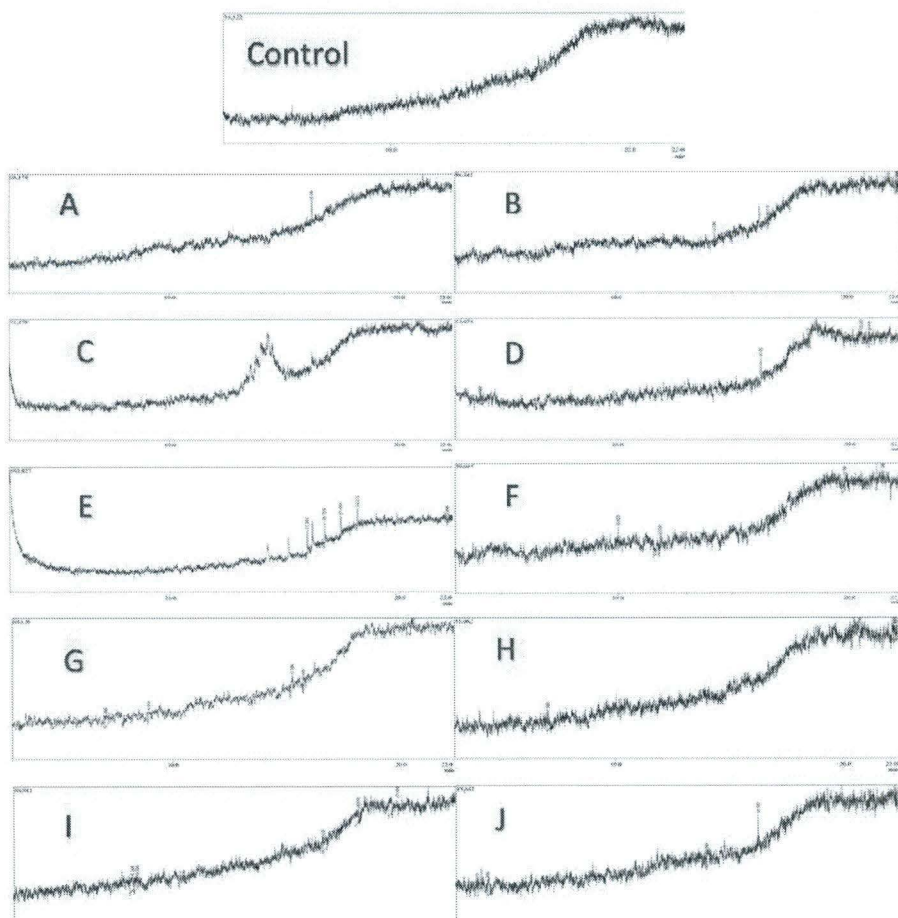


Figure 4 Control, A-J: Preliminary data for samples run on GC-MS using HPLC hexane solvent. All of the samples are a combination of leaf carrying and non-leaf carrying ants in order to maximize pheromone concentration. All graphs showing no significant concurrent peaks, however a potential peak at 16min may be observed after further optimization. Figure-C shows contamination from the previous run done on GC-MS unrelated to pheromones.

sults shown in figure 4 reveal that there are potential peaks that coincide with the sample analyzed in the GC-MS column, but no peaks that appear repeatedly.

Discussion

Lacking reproducible peaks during the analysis of the samples means that one of two changes must be made. Switching to a split-less GC-MS method would allow for a much more sensitive characterization of the analytes that are in the prepared sample. The other new procedure that could compensate for the lack of sensitivity available on the current GC-MS machine would be to optimize the track to its fullest. Measures are underway to improve the amount of pheromones that are deposited and the purity of pheromones that can be extracted. Along with the Teflon tubing, glass fibers and filter paper will be used as a path for the ants to walk along and deposit pheromones. The idea behind the use of the fibers is that the Teflon is potentially resistant to chemical alteration, and it is possible that the secreted pheromones remain on the abdomen of the ant rather than being deposited onto the track. The glass fiber and filter paper will act as a type of sponge, allowing for the pheromones to wick off of the abdomen and be held by the material. Another optimization property that the glass fiber and filter paper enable is the possibility that purity of the collected sample would be greater. Instead of allowing the substrate to come into contact with the environment, it is now taken straight from the track and placed into a vial containing the HPLC hexanes and sealed. The sample can then be drawn directly from the vial and put into the GC-MS vial. Another method for optimization is the use of the chemical differences between the potential pheromones and the HPLC hexanes. The hexanes are small molecules with high evaporation levels at standard room temperature, but trail pheromones are larger molecules that do not vaporize for approximately

24 hours^{3,11}. Because of evaporation, there will be a greater likelihood of a maximized amount of pheromones with the hexanes that would, in turn, allow for a greater probability for the pheromones to be picked up by the detector. Once the optimization is great enough and reproducible peaks are obtainable, this research may change the current methodology on path choice and the selection process the ants go through in picking the paths.

References

1. Lenoir, A., Depickère, S., Devers, S., Christidès, J.-P. & Detrain, C. Hydrocarbons in the Ant *Lasius niger*: From the Cuticle to the Nest and Home Range Marking. *Journal of Chemical Ecology* 35, 913–921 (2009).
2. Farji-Brener, A. G. et al. Information transfer in head-on encounters between leaf-cutting ant workers: food, trail condition or orientation cues? *Animal Behaviour* 79, 343–349 (2010).
3. Kern, F. et al. Mellein, a trail pheromone component of the ant *Lasius fuliginosus*. *Journal of chemical ecology* 23, 779–792 (1997).
4. Grasso, D. A., Sledge, M. F., Moli, F. L., Mori, A. & Turillazzi, S. Nest-area marking with faeces: a chemical signature that allows colony-level recognition in seed harvesting ants (Hymenoptera, Formicidae). *Insectes Sociaux* 52, 36–44 (2005).
5. Czaczkes, T. J., Franz, S., Witte, V. & Heinze, J. Perception of collective path use affects path selection in ants. *Animal Behaviour* 99, 15–24 (2015).
6. Sonnet, P. E. & Moser, J. C. Synthetic analogs of the trail pheromone of the leaf-cutting ant, *Atta texana*. *Journal of Agricultural and Food Chemistry* 20, 1191–1194 (1972).
7. Kelber, C., Rössler, W., Roces, F. & Kleineidam, C. J. The Antennal Lobes of Fungus-Growing Ants (Attini): Neuroanatomical Traits and Evolutionary Trends. *Brain, Behavior and Evolution* 73, 273–284 (2009).
8. Ngenkaew, W., Ono, S. & Nakayama, S. The deposition of multiple pheromones in ant-based clustering. *International Journal of Innovative Computing, Information and Control* 4, 1349–1498 (2008).
9. Dussutour, A., Nicolis, S. C., Shephard, G., Beekman, M. & Sumpter, D. J. T. The role of multiple pheromones in food recruitment by ants. *Journal of Experimental Biology* 212, 2337–2348 (2009).
10. Choe, D.-H., Villafuerte, D. B. & Tsutsui, N. D. Trail Pheromone of the Argentine Ant, *Linepithema humile* (Mayr) (Hymenoptera: Formicidae). *PLoS ONE* 7, e45016 (2012).
11. David Morgan, E. Trail pheromones of ants. *Physiological Entomology* 34, 1–17 (2009).
12. Beckers, R., Deneubourg, J. L. & Goss, S. Trails and u-turns in the selection of a path by the ant *Lasius Niger*. *Journal of Theoretical Biology* 397–415 (1992).

Proton Exchange Rates on Hydroxide Bridges of the Mineral-Like $\text{Ga}_{13}(\mu_3\text{-OH})_6(\mu_2\text{-OH})_{18}(\text{H}_2\text{O})_{24}(\text{NO}_3)_{15}$ Cluster

Caitlyn Fields

Biochemistry

Mentor: Darren W. Johnson
UO Chemistry, Biochemistry

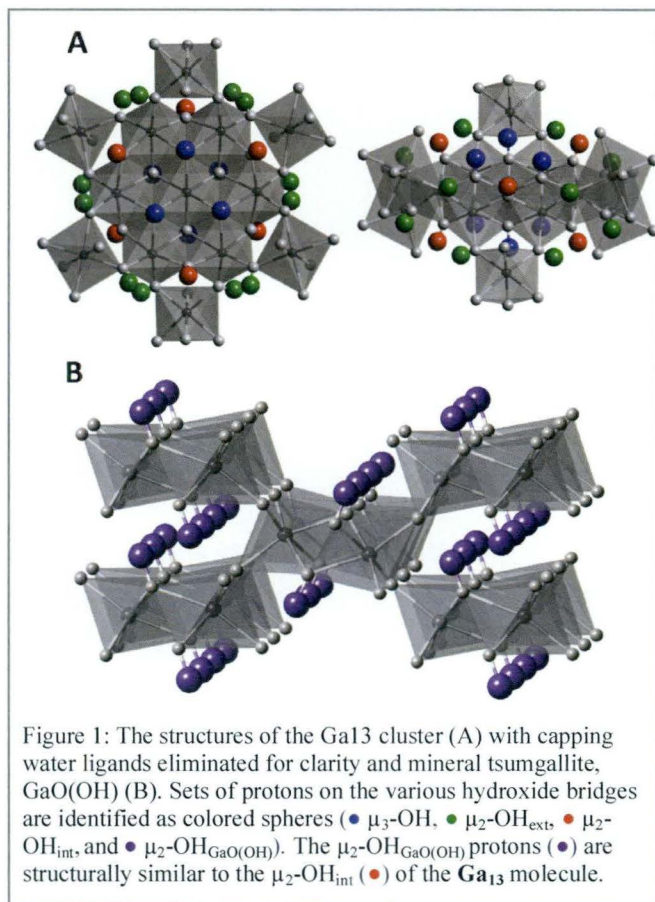
Mentor: Anna Oliveri
Chemistry, UC Davis

Mentor: William Casey
Chemistry, UC Davis

Introduction:

Little is known about the molecular-scale dynamics of sheet-like hydroxide materials in spite of their importance to environmental chemistry and materials science. These sheets are often made of trivalent metals, and they have a close similarity to some metal-hydroxide clusters. For example, the mineral tsumgallite ($\text{GaO}(\text{OH})$) (Figure 1B) is rare in nature but is isostructural with the very common soil minerals diaspore ($\text{AlO}(\text{OH})$) and goethite ($\text{FeO}(\text{OH})$).¹ Furthermore, $\text{GaO}(\text{OH})$ is a key intermediate in thin films formed from aqueous clusters of $\text{Ga}(\text{III})$. Apparently amorphous $\text{GaO}(\text{OH})$ is the main component of solution-processed thin films before the final annealing step dehydrates it to Ga_2O_3 . Table 1 includes examples of Group 13 materials and the mineral analogues.

These clusters are important as experimental models. For many years, geochemists had no good systems to estimate the dynamics of elementary

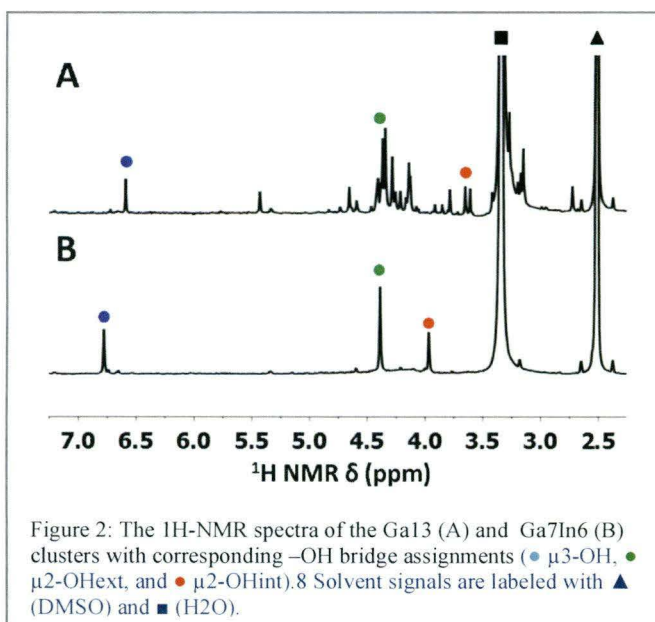


processes, such as proton-exchange, electron-exchange, or ligand-substitution reactions for mineral-like materials. The need for such data became more pressing as computational models advanced and the experimental verification lagged because it is so difficult to follow molecular processes in solids. Fortunately, methods of syntheses have ad-

vanced to provide stable, monospecific solutions of useful metal cluster ions. In this study we address the kinetics of proton exchange between bulk water and hydroxide bridges of the $\text{Ga}_{13}(\mu_3\text{-OH})_6(\mu_2\text{-OH})_{18}(\text{H}_2\text{O})_{24}(\text{NO}_3)_{15}$ (Ga_{13}) and $\text{Ga}_7\text{In}_6(\mu_3\text{-OH})_6(\mu_2\text{-OH})_{18}(\text{H}_2\text{O})_{24}(\text{NO}_3)_{15}$ (Ga_7In_6) clusters (Figure 1A). These clusters are isostructural except that the outer six $\text{Ga}(\text{III})$ ions in the Ga_{13} are substituted for $\text{In}(\text{III})$ ions in the Ga_7In_6 .

Table 1: Group 13 thin films of interest and the mineral analogues.

Film Structure	Mineral Analogue	Use in Materials Industry
Al_2O_3	Corundum	Solar cells ²⁻⁴
Ga_2O_3	-	H_2 sensors, ⁵ thin film transistors ⁶
$GaInO_3$	-	Transistors
$AlO(OH)$	Diaspore, Boehmite	Intermediate in Al_2O_3 film formation from $Al(OH)_3$ precursors
$GaO(OH)$	Tsumgallite ¹	Intermediate in Ga_2O_3 film formation from $Ga(OH)_3$ precursors
$Al(OH)_x$	Gibbsite	Soluble precursor for Al_2O_3 films
$Ga(OH)_x$	Söhngeite	Soluble precursor for Ga_2O_3 films ⁷



We recently assigned ^1H -NMR signals for all $[\text{Ga}_{13-x}\text{In}_x(\mu_3\text{-OH})_6(\mu_2\text{-OH})_{18}(\text{H}_2\text{O})_{24}](\text{NO}_3)_{15}$ ($0 \leq x \leq 6$) cluster species in wet d_6 -dimethylsulfoxide (d_6 -DMSO) (Figure 2).^{8,9} With these peaks assigned, it is now possible to study the kinetics of proton-exchange events at specific sites within these clusters. A similar technique was previously used on the Al_{13} Keggin cluster;¹⁰ however, no gallium analogues have been studied to date. To our knowledge, these are the only such data for Group 13 clusters in solution.

Structural Setting of Protons:

When they are completely ligated with water, the Ga_{13} and Ga_7In_6 have D_{3d} symmetry and 3 types of hydroxide bridges (Figure 1A).⁸ Each of the bridges ($\mu_3\text{-OH}$, $\mu_2\text{-OH}_{\text{ext}}$, and $\mu_2\text{-OH}_{\text{int}}$) are visible in the ^1H -NMR spectrum, have unequivocally been assigned, and behave uniquely in solution (Figure 2). The $\mu_2\text{-OH}_{\text{ext}}$ bridges bind the exterior metal ions to the planar 7-ion Ga(III) core of the clusters. Both the $\mu_3\text{-OH}$ and $\mu_2\text{-OH}_{\text{int}}$ bridges hold together the planar 7-ion Ga(III) core. The protons on these bridges bind perpendicularly to the surface, similar to the protons on thin film surfaces and between perpendicular sheets in minerals (e.g., boehmite, gibbsite) where hydrogen bonding holds the structure together. The $\mu_2\text{-OH}_{\text{int}}$ bridges of the Ga_{13} cluster will provide the best model for the $\mu_2\text{-OH}_{\text{GaO}(\text{OH})}$, and the $\mu_3\text{-OH}$ of the Ga_{13} resemble the bridges in söhngeite.

$\mu_3\text{-OH}$ Bridge Results:

The ^1H -NMR of the $\mu_3\text{-OH}$ bridges are the farthest downfield (6.5-6.8 ppm), and therefore the most acidic proton site on the cluster, just as one would expect.¹¹ In ^1H -NMR spectra of the Ga_{13} , the signal associated with the proton of this bridge disappears over time, indicating a slow, yet unidentified deprotonation reaction (Figure 3).⁹ This signal persists in the ^1H -NMR spectrum for anywhere from approximately 1 week to a few hours, depending upon the concentration of water in the d_6 -DMSO

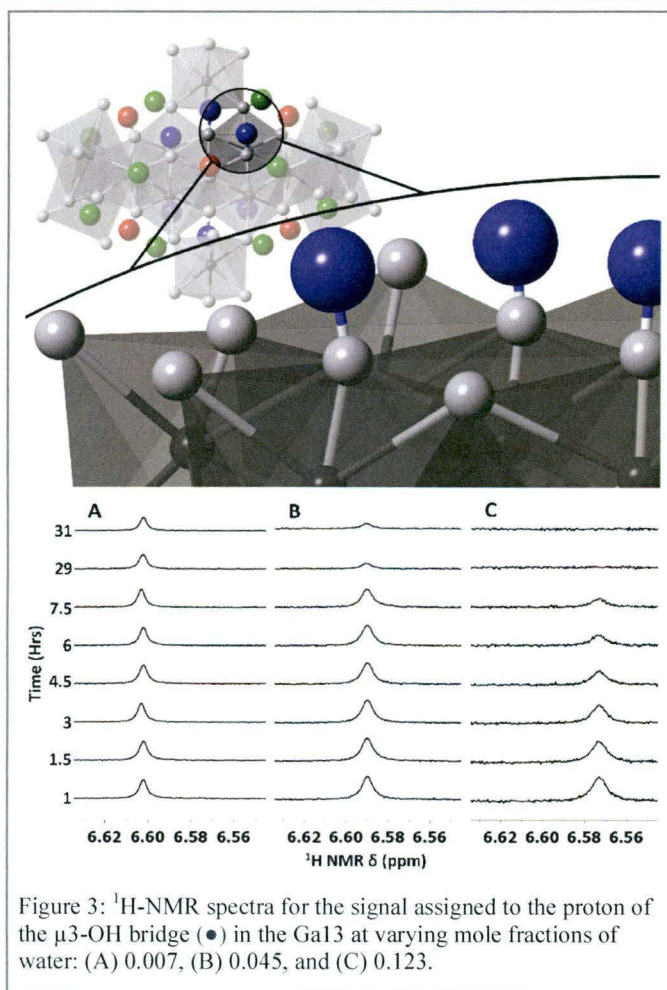


Figure 3: 1H -NMR spectra for the signal assigned to the proton of the μ_3 -OH bridge (●) in the Ga_{13} at varying mole fractions of water: (A) 0.007, (B) 0.045, and (C) 0.123.

solvent. The area of the μ_3 -OH peak can be directly related to concentration $\left(\frac{C(t)}{C_0}\right)$ of these sites in solution because we use an internal standard (1,3,5-trichlorobenzene). By plotting the normalized concentration of the μ_3 -OH protons with respect to time (s), the resulting slope yields a reaction rate (Figure 4). Peaks with $\frac{C(t)}{C_0} \leq 0.05$ were not included because the small intensities and linewidths could not be estimated with

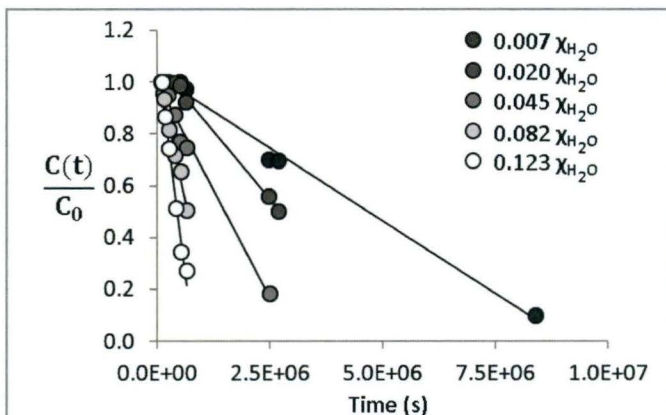


Figure 4: The normalized concentration ($C(t)/C_0$) of the μ_3 -OH protons of the Ga13 clusters as a function of time. Note that the signals disappear more quickly at higher mole fractions of water in the solvent (χ_{water}).

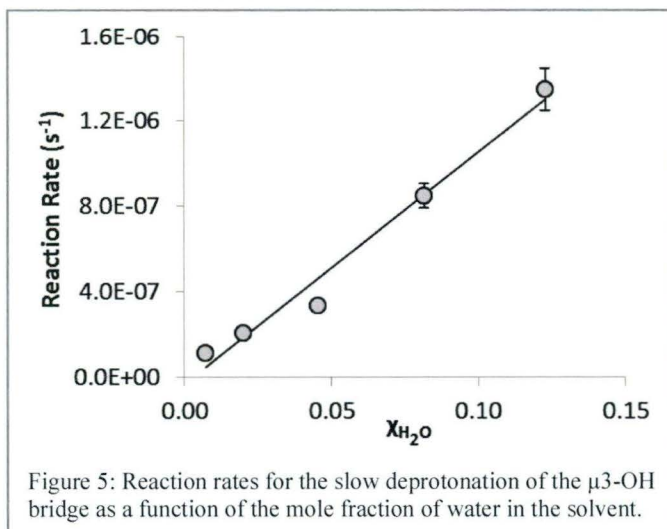


Figure 5: Reaction rates for the slow deprotonation of the μ_3 -OH bridge as a function of the mole fraction of water in the solvent.

precision. To determine the rate constant (k_{298}) for this slow deprotonation reaction, the rates from Figure 4 are plotted as a function of water concentration (Figure 5). The linearity of data (Figure 5) indicates that the reaction is first order with respect to water, with a rate constant $k_{298} = 1.1 \times 10^{-5} \pm 0.1 \times 10^{-5} \text{ s}^{-1}$.

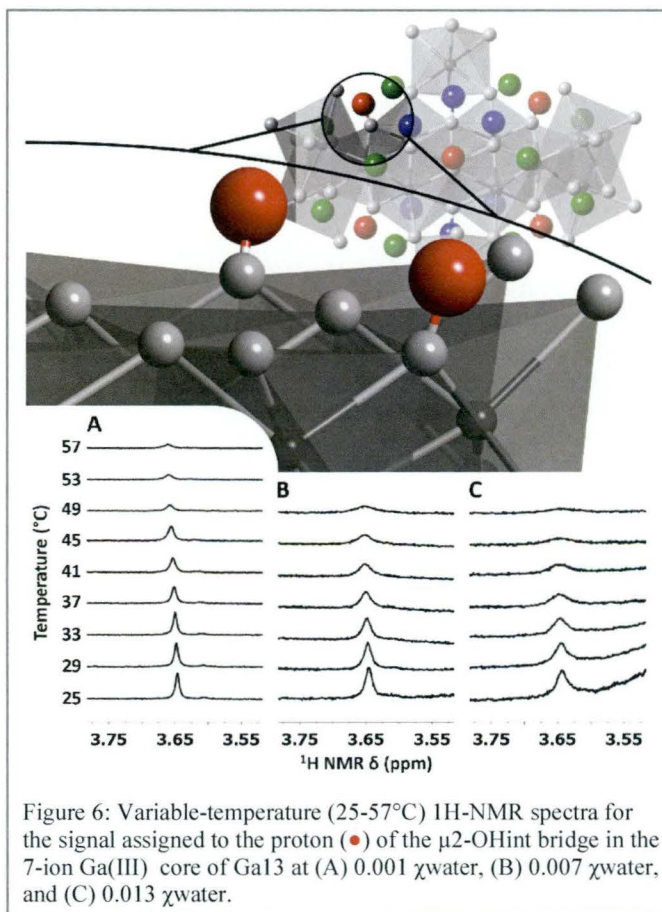
In contrast to the Ga_{13} , signals for the $\mu_3\text{-OH}$ proton in the Ga_7In_6 cluster did not change with time in the ^1H -NMR spectra, indicating no apparent reaction. Because we did not see evidence for slow elimination of this proton in the Ga_7In_6 cluster, we could conduct VT-NMR experiments to estimate the rates of exchange of the proton from NMR line broadening. However, no broadening was observed, indicating that the proton is not exchanging at the NMR time scale, which is another difference in kinetic behavior between the Ga_{13} and Ga_7In_6 clusters.

$\mu_2\text{-OH}_{\text{ext}}$ Bridge Results:

Our previous work found that the outermost metal ions exchange slowly (days) in the mixed-metal clusters.¹¹ Because the VT-NMR indicates no rapid proton exchanges, we speculate that the protons may be exchanging with the metal ion at these outer sites. We recognize, however, that the protons may be exchanging much more rapidly than the metals, but just at rates that are much slower than the ^1H -NMR timescale.

$\mu_2\text{-OH}_{\text{int}}$ Bridge Results:

The $\mu_2\text{-OH}_{\text{int}}$ bridges have the only proton signals which exhibit evidence of exchange with bulk water (Figure 6) on the ^1H -NMR timescale. Line-shape analysis can be used to calculate exchange rates using modified forms of the Bloch Equations under the following conditions:¹⁰ 1) The proton transfer occurs in the slow-exchange regime, where the frequency separation (Hz) between the site signal and bulk water signal is much larger than the rates of exchange. 2) The system can be approximated as undergoing only two-site exchange; practically this means that a proton on a cluster exchanges only with bulk water and not with other sites on the cluster as well. 3) There is a large excess of water relative to the exchanging site (in these experiments, there were at least 2,000 water molecules per Ga_{13} cluster in the driest solvent systems used). This system meets the



three conditions; therefore, the difference of the full-width-at-half-maximum (FWHM) relative to the inherent linewidth (FWHM_0) of a signal can be related to the lifetime of a proton (τ) and the rate constant (k) using Equation 1:

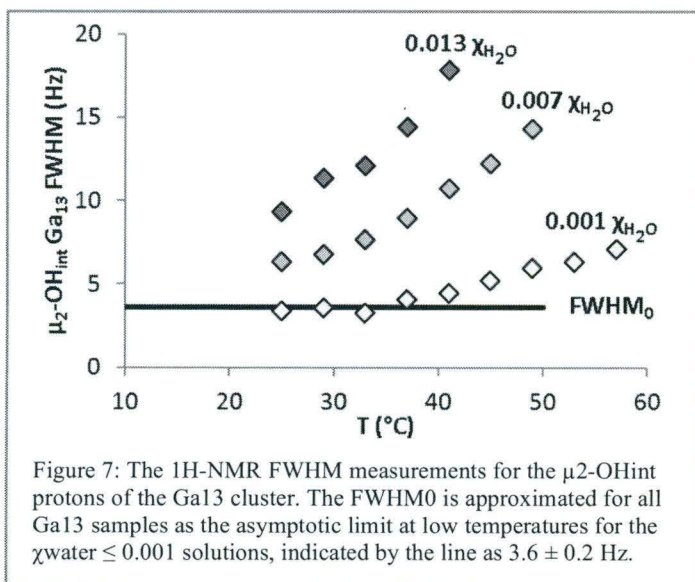
$$\frac{1}{\tau} = k = \pi(\text{FWHM} - \text{FWHM}_0) \quad (1)$$

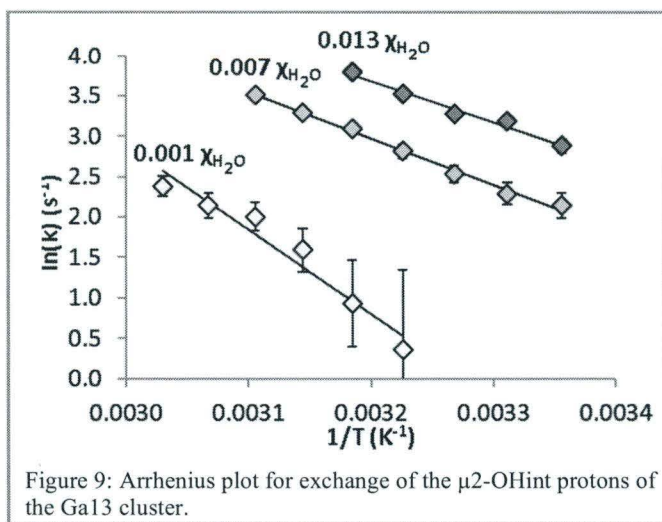
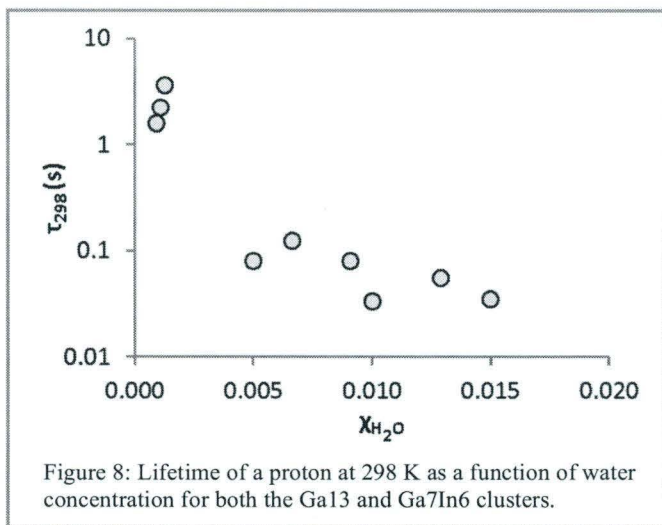
The FWHM_0 must be measured in the absence of chemical exchange. The FWHM_0 for Ga_{13} was estimated to be 3.6 ± 0.2 Hz for all samples by

averaging the lowest-temperature measurements (25–33 °C) from samples with the least amount of water present ($\chi_{\text{water}} \leq 0.001$). At these conditions, the linewidths did not vary with temperature and had asymptotically reached a constant value (Figure 7).

To measure rates, ^1H -NMR spectra were collected over the temperature range 25 to 57°C with varying concentrations of water in the solvent. Although the cluster had limited solubility in d_6 -DMSO (~2mM), the signal intensities were adequate. The maximum change in FWHM for Ga_{13} ranges from 2 to 14 Hz in this temperature range, depending on the concentration of water in the solvent (Figure 6-7).

The lifetime of a proton at room temperature (τ_{298}) for samples where $\chi_{\text{water}} > 0.001$ is ~40 ms (Figure 8). The values for τ_{298} at the driest conditions ($\chi_{\text{water}} \leq 0.001$) could only be estimated from experiments at relatively high temperatures, followed by back-calculation of the rates to room temperature conditions where there is no evidence of broadening (see below).





To make the back-calculation, we used the Arrhenius Equation to determine activation parameters for the exchange reaction. The Napierian logarithm of the rate constants, $\ln(k)$, were plotted with respect to $1/T$ (K^{-1}) (Figure 9). The resulting data were fit to the linear equation:

$$\ln(k) = -\frac{E_a}{R} \left(\frac{1}{T} \right) + \ln(A) \quad (2)$$

in order to estimate activation parameters, including the enthalpy of activation ($\Delta H_{298}^\ddagger$) using equation 3:

$$\Delta H_{298}^\ddagger = E_a - RT \quad (3)$$

and the entropy of activation ($\Delta S_{298}^\ddagger$), which is calculated from the intercept and Equation 4:

$$\Delta S_{298}^\ddagger = R \ln(A) - R \ln \left(\frac{k_B T}{h} \right) - R \quad (4)$$

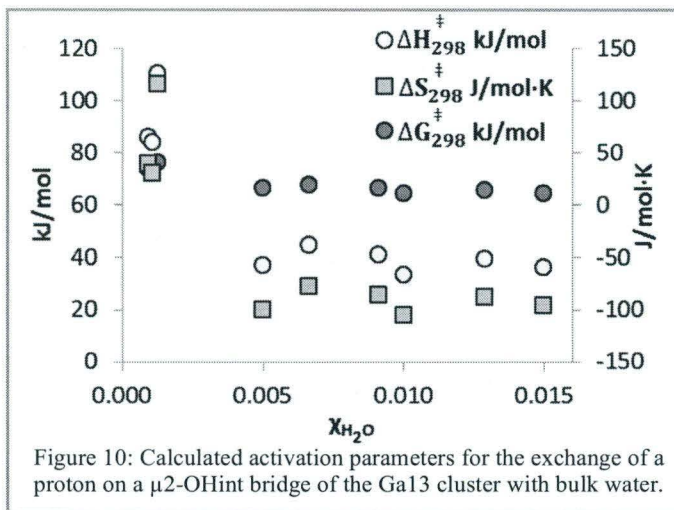
Finally, $\Delta G_{298}^\ddagger$ can be determined using Equation 5:

$$\Delta G_{298}^\ddagger = \Delta H_{298}^\ddagger - T \Delta S_{298}^\ddagger \quad (5)$$

Both $\Delta H_{298}^\ddagger$ and $\Delta S_{298}^\ddagger$ for exchange of a proton on the μ_2-OH_{int} bridges of Ga_{13} are affected by the addition of water (Figure 10). However, the values quickly reach a constant value as water increases in the solvent. We extrapolate the weak dependence at these concentrations to estimate rates for a purely aqueous solution. Our estimates are:

$$\begin{aligned} \Delta H_{298}^\ddagger &= 39 \pm 4 \text{ kJ/mol}, \Delta S_{298}^\ddagger = -90 \pm 10 \text{ J/mol}\cdot\text{K}, \\ \text{and } \Delta G_{298}^\ddagger &= 66 \pm 1 \text{ kJ/mol}. \end{aligned}$$

The $\Delta S_{298}^\ddagger$ changes sign as water is added to the solution, indicating that water orders the system, as is expected, since hydrogen bonding from waters must activate exchange. Using the activation parameters, we can back calculate the lifetimes of protons in the driest solvent at $\sim 2\text{-}3$ s, which is, of course, beyond the NMR timescale.



Unfortunately, it was extremely difficult to accurately measure FWHM_0 of the μ_2 -OH_{int} bridges in the Ga_7In_6 cluster. The maximum observed change in FWHM was only 2-3 Hz, and these differences are too small to estimate rates accurately via Equation (1) (See Supplemental Information).

To test the accuracy of our approximations, six sets of data ($0.02 \leq \tau \leq 0.0008$ s) were generated by solving the Bloch-McConnell equations for two-site exchanges and for two cases where $|\nu_w - \nu_{\text{Ga}}| = 2000$ and 5000 Hz, and where $|\nu_w - \nu_{\text{Ga}}|$ is the difference, measured in Hertz, of the resonance of the ^1H -NMR signals from water and sites on the Ga_{13} , respectively. In the simulations, the intensity of the Ga_{13} signal was set 0.0005 that of the proton signals to approximate our case where the concentrations of protons in exchanging sites differ by a large amount. The synthetic data were then treated as experimental results. In each case, the approximations were found to be appropriate and led to estimates of τ that are accurate to within a factor of two. This variation is within the uncertainties given by errors in the activation parameters that are exponentiated.

Conclusions:

The values for Ga_{13} compare well with those measured for the Al_{13} Keggin ion at similar conditions (Table 2) and fall into the millisecond time scales. The result is important because the clusters are not only structurally distinct but also have different Group 13 metals. The results suggest that the rates of proton exchange on these hydroxyl bridges might be determined by bonding to the oxygen and relatively unaffected by the distal metal. We recognize that these are the only such measurements, and future experiments are needed to support or reject the similarity.

Table 2: Activation parameters for exchange of protons from μ_2-OH on Group 13 clusters.

Cluster Bridge	τ_{298} (s)	$\Delta H_{298}^\ddagger$ (kJ/mol)	$\Delta S_{298}^\ddagger$ (J/mol·K)
Ga_{13} μ_2-OH_{int}	0.04 ± 0.01	39 ± 4	-90 ± 10
Al_{13} μ_2-OH_{fast}	0.013	20 ± 1	-140 ± 2
Al_{13} μ_2-OH_{slow}	0.201	23	-153

Besides the suggestion that rates are similar between the Ga_{13} and Al_{13} cluster, an additional unanswered question is whether the rates are affected by the cluster charges and solution pH. From studies of minerals there seems to be a strong relationship between surface charge and kinetics of reactions so that any rates vary in a broad amphoteric distribution with pH as the solid develops positive or negative surface charge. In these clusters the surface charge would be controlled by acid base reactions and possibly by ion association. In our experiments surface charge is not controllable because of the mixed-solvent systems. We can, however, change the overall charge of a cluster via suitable choice of a ligand and examine the effect on proton lifetimes. These experiments are underway.

Experimental:

The clusters used for this study were synthesized using previously published methods,¹² and the Ga:In ratio was confirmed using ¹H-NMR.¹³ The *d*₆-DMSO was dried with sieves to achieve $\chi_{\text{water}} \leq 0.001$. All ¹H-NMR data were collected on a 500 MHz Varian Spectrometer.

References:

- (1) Schluter, J.; Karl-Heinz, K.; Adiwidjaja, G.; Gebhard, G. *Neues. Jb. Miner. Monat.* **2003**, 521–527.
- (2) Bai, Y.; Mora-Sero, I.; De Angelis, F.; Bisquert, J.; Wang, P. *Chem. Rev.* **2014**, *114* (19), 10095–10130.
- (3) Hagfeldt, A.; Boschloo, G.; Sun, L.; Kloo, L.; Pettersson, H. *Chem. Rev.* **2010**, *110*, 6595–6663.
- (4) Wu, J.; Lan, Z.; Lin, J.; Huang, M.; Huang, Y.; Fan, L.; Luo, G. *Chem. Rev.* **2015**, *115* (5), 2136–2173.
- (5) Korotcenkov, G.; Han, S. Do; Stetter, J. R. *Chem. Rev.* **2009**, *109* (3), 1402–1433.
- (6) Thomas, S. R.; Adamopoulos, G.; Lin, Y.-H.; Faber, H.; Sygellou, L.; Stratakis, E.; Anthopoulos, T. D. *App. Phys. Lett.* **2014**, *105* (9).
- (7) Bloor, L. G.; Carmalt, C. J.; Pugh, D. *Coord. Chem. Rev.* **2011**, *255* (11-12), 1293–1318.
- (8) Oliveri, A. F.; Wills, L. A.; Hazlett, C. R.; Carnes, M. E.; Chang, I.-Y.; Ha-Yeon Cheong, P.; Johnson, D. W. *Chem. Sci.* **2015**, *6* (7), 4071–4085.
- (9) Oliveri, A. F.; Carnes, M. E.; Baseman, M. M.; Richman, E. K.; Hutchison, J. E.; Johnson, D. W. *Angew. Chem. Int. Ed.* **2012**, *51* (44), 10992–10996.
- (10) Houston, J. R.; Phillips, B. L.; Casey, W. H. *Geochim. Cosmochim. Ac.* **2006**, *70* (7), 1636–1643.
- (11) Oliveri, A. F. Solution Characterization of Inorganic Nanoscale Cluster Species via 1H-NMR and DOSY, University of Oregon, 2015.
- (12) Mensinger, Z. L.; Gatlin, J. T.; Meyers, S. T.; Zakharov, L. N.; Keszler, D. A.; Johnson, D. W. *J. Chem. Soc. Dalton Trans.* **2008**, *120* (49), 9626–9628.
- (13) Carnes, M. E.; Knutson, C. C.; Nadarajah, A.; Jackson, M. N.; Oliveri, A. F.; Norelli, K. M.; Crockett, B. M.; Bauers, S. R.; Moreno-Luna, H. A.; Taber, B. N.; Pacheco, D. J.; Olson, J. Z.; Brevick, K. R.; Sheehan, C. E.; Johnson, D. W.; Boettcher, S. W. *J. Mater. Chem. C* **2014**, *2* (40), 8492–8496.

Malcolm X and Martin Luther King Jr.: The Vanishing Point of Two Black Streams of Consciousness

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The Rev. Dr. Martin Luther King Jr. and el-Hajj Malik el-Shabazz, known to many as Minister Malcolm X, were two prominent African American leaders during the second phase of the twentieth century Civil Rights movement. Today, they are remembered less for their varying principled stands and more for their mass media depictions. Their legacies have been transmitted through caricatures and soundbites, and people often pick and choose quotable statements, manipulating the context of their speeches to create a desired narrative. Over time, the interpretations of the media, scholars, and other civil rights leaders have diluted the messages of both King and el-Shabazz. The way we remember these figures does not portray a complete understanding of either leader. King and el-Shabazz were selfless leaders dedicated to securing rights for blacks in America and willing to die for speaking the truth. Both emerged as leaders selected by the people. It is not by accident, nor should it be a surprise, that many African Americans were drawn to both leaders because of their transparency and authenticity.

Contemporary understandings of King and el-Shabazz have situated the two as polar opposites. King's legacy is constructed around his battle against segregation, but more often this constructed legacy fails to include his critiques of American poverty, militarism, racism, and materialism.

Furthermore, King has been celebrated with a national holiday, and his “I Have a Dream” speech, given in August 1963 in Washington, D.C., is famously used to support colorblindness. The commercial co-optation of King’s life and image has turned him into a tolerant, domesticated icon that both political parties have embraced. Because his radicalism has been overlooked, he is seen as “an idealistic dreamer.”¹

Conversely, el-Shabazz is seen only as a violent militant, despite never using violence to achieve any of his goals. The only federal recognition of el-Shabazz’s image has been preserved on a US postage stamp. Alex Haley’s *The Autobiography of Malcolm X*, Spike Lee’s 1992 film *Malcolm X*, and other interpretations paint his legacy as the polar opposite of King. Moreover, these popular media outlets have been the most widely consumed portrayals of his image. Current public opinion draws more on available discourse today than from el-Shabazz and King as the main sources.

The discourse overemphasizes their differences, creating a cycle that has divided black communities rather than unified them. Clayborne Carson has identified that tendency in his article, “Unfinished Business.” Carson addressed popular discourse and argued that “rather than recognizing the points of convergence in the ideas of King and Malcolm X, most black leaders of the era, after King’s death in 1968, saw them as irreconcilable alternatives. Black people were advised to choose between King and Malcolm X, rather than affirming that each offered a partial answer to the problems of the race.”²

Extensive autobiographies³ and biographies have circulated in the media, influencing public discourse and historical scholarship. However, scholars and biographers have not yet adequately compared the political messages and insights that were present in the speeches and published articles of the two men during their respective final years. Some of these

final messages were about unity among African Americans, with the direction of the black struggle extending to a global cause for human rights, economic justice, and the importance of taking pride in African American heritage. The objective of this research is to contribute to an emerging critical body of scholarship that has challenged popular understandings and the perceived differences of King and el-Shabazz by focusing on the political discourses that each leader mobilized in his final years. A comparative analysis of King and el-Shabazz's political positions in their final years reveals that they had congruent beliefs. Currently, there has been little comparison between their transformations, and there is little emphasis on the parallels in their final years. The parallelism in the final messages of King and el-Shabazz reveals the similar beliefs of the two figures. The vanishing point represents the perspective in which King and el-Shabazz's separate streams of consciousness converge.

Extensive literature regarding el-Shabazz and King, at very specific periods of their leadership, has either chosen one or the other as the focus of Civil Rights leadership in the last 50 years. As a result, widely held comprehension of King and el-Shabazz have situated the two as polar opposites. The foundation of King's legacy is his "I Have a Dream" speech during the March on Washington in 1963, a speech that ranks among the top ten speeches of all time according to *Time* magazine.⁴ The commercial co-optation of King's life and image creates a palatable icon that both political parties have embraced. In contrast, el-Shabazz's legacy centers around his rhetoric on violence.

During the Black Power Movement in the 1970s, black power supporters focused on el-Shabazz and "dismissed King's nonviolent strategy."⁵ Following the death of el-Shabazz in 1965, Alex Haley published *The Autobiography of Malcolm X*.⁶ Instantly, it became an important text, selling over six million copies by 1977.⁷ Following the release of

Spike Lee's 1992 film *Malcolm X*, sales of *The Autobiography of Malcolm X* increased by 300%.⁸ *The Autobiography of Malcolm X* depicts el-Shabazz's life from his birth in 1925 until his assassination in February 1965. The text follows the narrative of el-Shabazz going from street hustler and con artist, to black nationalist, and toward the end of his life, to a human rights activist. However, literary critics such as Michael Eric Dyson found the text flawed, saying that it "missed the mark" because it served both "Malcom's need to shape his personal history" and Alex Haley's "political biases and ideological purposes."⁹ *The Autobiography of Malcolm X* compresses el-Shabazz's final years into two chapters, which overlook his two newly formed organizations, and does not discuss his trip to Selma nor include attempts to visit King in prison.

Dyson's *Making Malcolm: The Myth and Meaning of Malcolm X* examines the rebirth of el-Shabazz's legacy in the 1990s. Dyson argued that the rebirth of el-Shabazz's legacy was filled with different contradicting interpretations from scholars, filmmakers, the hip-hop generation, nationalists, and young black men. Dyson argued these interpretations cloud el-Shabazz's greatest accomplishments.¹⁰ Manning Marable's *Malcolm X: A Life of Reinvention* challenged how el-Shabazz and Alex Haley shaped a particular image of el-Shabazz.¹¹ Marable filled gaps with his in-depth research, allowing for an examination of el-Shabazz's life from several angles. Marable spent a considerable amount of time describing el-Shabazz's final year, including his break away from the Nation of Islam (NOI), and his trip to Mecca in 1964. In their recent biography *Malcolm X: A Biography*, scholars A.B. Assensoh and Yvette Alex-Assensoh analyze the historical and political context of the life and leadership of el-Shabazz. The book devotes a whole chapter to discuss el-Shabazz's final trip to Africa in 1964 and his attempts to create strong relationships with important figures in the African continent.¹²

During the rise of the liberal multi-culturalism in the 1980s, King's image was resurrected. After his death in 1968 and the release of his manuscripts at both Boston University and the King Center, there was an emergence of new major studies that became relevant in the 1980s.¹³ At the same time that scholars were producing work on King, a campaign to celebrate King's birthday as a national holiday emerged.¹⁴ He became increasingly recognized as a symbolic figure of the 20th century's social justice struggle. According to Clayborne Carson, scholarship on King has "paradoxically become more thematically ambitious and yet often more narrowly specialized."¹⁵ King himself had published three major books: *Stride Toward Freedom: The Montgomery Story*; *Why We Can't Wait*; and *Where Do We Go From Here: Chaos or Community?*¹⁶ Often, scholars use these texts as starting points because they reveal insights into King's intellectual and political evolution.

Out of this wave of scholarship in the 1980s, David Garrow and Taylor Branch¹⁷ are two of the most prominent King scholars. Garrow's *Bearing the Cross* contributes in-depth factual description containing interviews from King's closest associates, newspapers, articles, and writings and copies of FBI wiretaps that made known King's shortfalls and weaknesses. Garrow's insight into King's final year revealed a stressed and deeply troubled man. Taylor Branch contributes to King scholarship with his three-volume biography—*Parting The Waters*, *Pillar of Fire*, and *At Canaan's Edge*—that covers King's life from 1954-1968. Each author focused neither on King nor the civil rights movement as the main subject, but rather on the intersection between King and civil rights. Although King was the central figure in the books, Branch made sure to include other important figures during the movement such as the Kennedys and J. Edgar Hoover.

While the works of Garrow and Branch remain a starting point for King scholarship, recent literature on King has challenged these repre-

sentations. For example, in *Death of a King: The Real Story of Dr. Martin Luther King Jr.'s Final Year*, Travis Smiley brought attention to the little-known life King led in his final year. Smiley's text chronologically examined the last twelve months that led up to King's assassination drawing from interviews and biographies by Taylor Branch and Clayborne Carson. The book fleshes out the man behind the idealized image. Instead of focusing on King as an "idealistic dreamer," Smiley concludes that "the final leg of King's journey was far rougher" than he had imagined.¹⁸ Smiley's work revealed that King's positions became more radical in his last year, but the move toward radicalization began years before, as scholar Cornell West has revealed. West, in *The Radical King*, focused on King's political radicalism that began to shift toward the end of the 1960s, presenting a little known radical side of King. In the introduction, West suggested that the more radical King is not as popular "because such courage defies our market-driven world."¹⁹ This text not only revealed King's thoughts during his final year, but also removed the veil that has had the effect of silencing the radical King.

James H. Cone's comparative assessment of King and el-Shabazz, *Martin & Malcolm & America*, is a prominent biographical work today. Cone's comparative study of both leaders not only challenges the separate narratives that many scholars have produced previously but also the cultural objects that they are today. His balanced comparison revealed how both leaders influenced one another, and how their intellectual paths overlapped. For example, in his chapter "Two Roads to Freedom," he described King and el-Shabazz as moving "away from the extremes of their original positions" toward embracing "aspects of each other's viewpoints."²⁰ Despite Cone's work, el-Shabazz and King's legacies continue to create division rather than unify and sustain unity among the oppressed. Often the division comes down to their differing views concerning the tactics of

non-violent action. Popular discourse, remembrance and interpretations of el-Shabazz and King tend to glorify each man individually rather than what they both stood for.

Vanishing Point

The views of el-Shabazz and King are usually perceived as widely separate. However, recent scholarship uncovers a merging consciousness in their respective final years. This is not to suggest that suddenly their views were parallel, nor that they had not been similar prior to their final year, but it is plausible to envision the vanishing point toward the end of their lives. March 26, 1964, is the only known encounter between King and el-Shabazz. As King left a press conference at the US Capitol Hill, the two crossed paths, and photographers, who gathered around as the two men shook hands, captured that moment. Clayborne Carson notes the “passing encounter did not bridge the gulf between the two men.” In fact, it was an unplanned encounter. The two never had a known direct dialogue, but with a close examination of their final years, they represent a vanishing point of two black streams of consciousness. The movement and the shaping of their ideas happened naturally over time and increased the more they engaged in the struggle for black freedom. The life of el-Shabazz was cut short as he began to move toward King. Similarly, King’s life was cut short as his radical side became more apparent to the public, and he shifted toward el-Shabazz. The untimely deaths of both men left them and their messages at the vanishing point of black consciousness. Although their positions in some ways seem like dramatic shifts, they had in fact been evolving. Both el-Shabazz and King were highly critical of American hypocrisy, white backlash, and integration. Despite the superficial portrayal of differences, a critical engagement of key passages reveal that they both were approaching converging stances on human rights, eco-

nomic justice, and pride in African American heritage.

El-Shabazz had begun his departure from the Nation of Islam in early 1964, and coincidentally, March 26, 1964 (the day of the handshake shared between el-Shabazz and King) symbolized an evolution for el-Shabazz. His consciousness was evolving toward a rhetoric that dealt with the “improvement of the black condition through changing the American system.”²¹ Just a few days later, after meeting King, el-Shabazz gave the “Ballot or Bullet Speech” in which he stressed the need for blacks to register to vote. He also called attention to the need for unity. “Unity is the right religion,” he asserted. “Black people must forget their differences and discuss the points on which they can agree.”²² His break with the Nation also allowed him to practice what he called true Islam. In the spring of 1964, el-Shabazz returned from his life-altering trip to Mecca. Upon his return, he immediately began to envision the possibility of brotherhood. According to Manning Marable, “toward the end of his life he could imagine the destruction of racism itself, and the possibility of creating a humane social order devoid of racial injustice.”²³ El-Shabazz began moving away from black separatism toward a politics of global justice, which he referred to as human rights. He also established two organizations, the Organization of African American Unity (OAAU) modeled after the Organization of African Unity (OAU) and the Muslim Mosque Inc. (MMI), which served as a religious organization.

In addition to the organizations that he established, el-Shabazz also made it a priority to reach out to other civil rights organizations. In February of 1965, the Student Nonviolent Coordinating Committee (SNCC) invited el-Shabazz to speak in Selma, Alabama. During his trip, he attempted to visit King who was in prison at the time. However, owing to the resistance of local law enforcement officials, el-Shabazz was unable to visit. Nonetheless, he did speak with Coretta Scott King. In their brief

conversation, he amicably offered his viewpoints on the future of the non-violent movement and expressed his interest in working with King. If their status as leaders and climate of society would not allow them to work with one another, el-Shabazz believed that he would balance and augment King by offering himself as an alternative to white America. He told Mrs. King that "he didn't come to make [King's] job more difficult."²⁴ There was much resistance to el-Shabazz during that period of his evolution, and he was under consistent threat from some members of NOI as well as some government agencies. On February 14, 1965, seven days before his assassination, el-Shabazz and his family faced a direct attack when his house was bombed. His last year was extremely taxing and was ended tragically on February 21, 1965.

Until April 4, 1967, King had yet to speak on the war that continued to escalate in Vietnam. Sticking with his views against violence, King openly began to criticize US involvement in the war, calling it "an enemy of the poor" and noting that he would "attack it as such."²⁵ King strongly believed that social change was best achieved through non-violent action. However, with the war escalating, the younger, less patient activists saw potential contradiction in his argument. "They asked, and rightly so, 'What about Vietnam?' They asked if our own nation wasn't using massive doses of violence to solve its problems, to bring about the changes it wanted."²⁶ For King, this question was crucial, and he took it seriously. He stated, "I knew that I could never again raise my voice against the violence of the oppressed in the ghettos without first having spoken clearly to the greatest purveyor of violence in the world today: my own government."²⁷ In King's "Beyond Vietnam" speech, he argued that "we as a nation must undergo a radical revolution of values... we must rapidly begin the shift from a thing-oriented society to a person-oriented society." He insisted that "when machines and computers, profit motives and property rights are considered

more important than people, the giant triplets of racism, extreme materialism, and militarism are incapable of being conquered.”²⁸ King challenged Americans to choose between “nonviolent coexistence or violent annihilation.”²⁹ King believed this choice “may well be mankind’s last chance to choose between chaos and community.”³⁰ As King’s ideas evolved in his final year, he was able to see the African American civil rights struggle as linked to an even bigger issue. King felt that “communism is a judgment on our failure to make democracy real.”³¹ He believed that once the US underwent this true revolution of values, it would cause Americans “to question the fairness and justice” of “past and present policies.”³² King was also aware of the challenge given “the Western arrogance of feeling that it has everything to teach others and nothing to learn.”³³ As a cautionary note, he asserted that “a nation that continues year after year to spend more money on military defense than on programs of social uplift is approaching spiritual death.”³⁴ King also put more emphasis on reducing poverty as the nation moved forward.

Some civil rights leaders saw King speaking out on the war as “betraying the cause,” a phrase used as a chapter title in Tavis Smiley’s *Death of a King*. As Smiley noted, many media outlets spoke out in opposition to King’s assessment. For example, the *Washington Post* claimed King “has done a grave injury to those who are his natural allies...and...an even graver injury to himself. Many who have listened to him with respect will never again accord him the same confidence. He has diminished his usefulness to his cause, to his country, and to his people.”³⁵ The criticism was not limited to the media or other external personnel. For instance, his mentor of many years, Bayard Rustin, asserted that “King has alienated many of the Negro’s friends and armed the Negro’s foes, in both parties, by creating the impression that the Negro is disloyal.”³⁶

After the backlash he received, King was viewed more as a contro-

versial civil rights activist. Moreover, as the year went on, his militancy became more visible. In response to his critics, he asserted that, “there’s something strangely inconsistent about a nation and a press that will praise you when you say, ‘Be non-violent toward Jim Clark,’ but will curse and damn you when you say, ‘Be non-violent toward little brown Vietnamese children.’ There’s something wrong with that press!” Many didn’t see the connection he saw between civil rights movement in American and the war abroad. The evolutionary period of King’s ideas continued throughout the year from his critiques of Vietnam, militarism, poverty, and materialism to his belief in America’s need to revolutionize its ideals from a “thing-oriented society to a person-oriented society.”³⁷ He called for a “true revolution of values.” Unfortunately, the same people who praise him today have often ignored much of his evolving ideas.

During his last few months, King stated in a conversation with Harry Belafonte, “I’m afraid that America may be losing what moral vision she may have had...And I’m afraid that even as we integrate, we are walking into a place that does not understand that this nation needs to be deeply concerned with the plight of the poor and disenfranchised.”³⁸ King, fearing that he may have worked to integrate into a failing system, added, “I’ve come to believe that we are integrating into a burning house.”³⁹ Instead, the popular image and imagination of King today shows him as an easy-going domesticated icon.

King had once been concerned about his popularity and how it would be interpreted. In an August 1967 address that he delivered at the annual convention of the National Association of Radio Announcers, King expressed his concern about his acceptance as a reasonable leader. King stated: “I always get a little worried when I’m referred to as a responsible leader because so often when some people call you a responsible leader they are really telling you that you are a leader who will not tell the truth

on behalf of your people.”⁴⁰ He continued to argue that when one is coined and accepted as a responsible leader, what that really means is “you are a leader more concerned about your budget than you are the freedom of your people. So often they really mean you are a leader willing to say to the white power structure what they want to hear rather than what they ought to hear.”⁴¹ Unfortunately, because of co-optation and romantic depiction of his radicalism, he has become known as the “leader willing to say to the white power structure what they want to hear rather than what they ought to hear.”⁴² As a result, this label became easily digestible for mass society. This label has also birthed the modern day rhetoric that king is an idealistic dreamer. Despondently, before his evolving critique was actualized, King’s life was cut short.

Parallel Messages

Pride in African American heritage was a point in which el-Shabazz and King converged. For el-Shabazz, the lack of pride was a serious issue. He once stated that “what divided us” in the black freedom movement was “our lack of pride. Our lack of racial identity. Our lack of racial pride. Our lack of cultural roots.”⁴³ He encouraged African Americans to have self-dignity and pride in where they came from. He argued that, because of white supremacy, African American’s were conditioned to think less of themselves. When they thought less of themselves, they expected less. To combat this internal inferiority complex, el-Shabazz believed that it was critical to study one’s history and that “the thing that has made the so-called Negro in America fail, more than anything, is your, my lack of knowledge concerning history.”⁴⁴ Therefore, he strongly believed that investing time to understand history would liberate African Americans and successfully combat self-hate and internal racism. This knowledge of self, for el-Shabazz, extended far beyond the history and experiences of the

enslaved Africans and their impact on African history prior to European civilizations. He felt it was important for African Americans to know the truth that they were not brought over on slave ships because they were perceived as inferior but because of their abilities.

Similar to el-Shabazz, in King's final year, he too took a stance on the importance of black pride. Toward the end of King's life he began to expand his teachings regarding pride. In particular, King's teachings expanded and focused on the need for African Americans to have pride in who they are. In a little known speech given in Cleveland, Ohio, in April 1967, King proclaimed African Americans needed to "sign" their own "emancipation proclamation."⁴⁵ Emphasizing self-help for the black community meant moving beyond reliance on governmental initiatives: "Nobody else can do this for us. No document can do this for us. No Lincolnian emancipation proclamation can do this for us. No Tennessonian or Johnsonian civil rights bill can do this for us."⁴⁶ Although the physical form of slavery was past, the posttraumatic damage caused by slavery remained. In essence, African Americans are physically free. Nevertheless, the residue of slavery is still present in the mental composition of African Americans. Freeing one's mind from mental enslavement was a significant piece, and King asserted that "as long as the mind is enslaved the body can never be free. Psychological freedom, a firm sense of self-esteem, is the most powerful weapon against the long night of physical slavery."⁴⁷ Overall, it was of significant importance for both el-Shabazz and King to speak on black pride and express it to their followers.

While abroad in 1964, el-Shabazz told the *Egyptian Gazette* that he believed African Americans could "never get civil rights" until their "human rights are first restored."⁴⁸ In other words, he charged that the United States of America failed to recognize African Americans as full humans deserving human rights. After shifting his rhetoric to human rights, el-

Shabazz believed that other nations could effectively add pressure to the US. He highlighted the African American struggle and depicted the black freedom movement as a critical component of a growing world problem. He believed that African Americans “will never be recognized as citizens” in America “until we are first recognized as humans... [because] the American ‘system’ (political, economic and social) was produced from the enslavement of the black man, and this present ‘system’ is capable only of perpetuating that enslavement.”⁴⁹

Similarly, in 1967 King began to express his views on human rights. According to King, the Civil Rights Movement must move from an “era of civil rights to the era of human rights.”⁵⁰ King went on to suggest “we in the civil rights movement must come all out now and make it clear that America is a hypocritical nation and that America must set her own house in order.”⁵¹ Because of their premature deaths, it is difficult to judge the exact degree to which el-Shabazz and King foresaw the African American struggle extending to human rights. Nevertheless, they both strongly believed that limiting the African American plight to a civil rights struggle neglected African-American historical experiences.

El-Shabazz and King thoroughly understood and shared a devotion to black consciousness. This evolving black consciousness was the foundational pathway that ultimately led them to the belief that African Americans must become more independent to achieve economic justice. El-Shabazz believed that African Americans should invest in themselves and in their communities by supporting black owned businesses. On April 12, 1964, in his “Ballot or Bullet” speech, he stated that “we should own, operate, and control the economy of our community... we have to become involved in a program of re-education to educate our people into the importance of knowing that when you spend your dollar out of the community in which you live, the community in which you spend your money becomes richer

and richer.”⁵² He understood that other communities, such as the Jewish community, were successful because they invested in themselves. The lack of investment in the community had slowed African American progress. By continuing to spend outside of the community, African Americans lost value in their community. According to el-Shabazz, this lack of economic cohesion contributed to the oppression African Americans faced. Speaking about the importance of a unified community, el-Shabazz asserted that “the only way our problem can be solved is that, instead of sitting around waiting for the white man to solve it, the black people have to come together. We have to forget our differences, our economic differences, our social differences.”⁵³ In the final year of King’s life, he too had come to realize the importance of self-help in the movement. By urging black self-reliance, King’s last speech asserted a stream of consciousness similar to that of el-Shabazz. According to King, “we’ve got to strengthen black institutions,” and by doing so “we begin the process of building a greater economic base.” He also suggested economic withdrawal to put “pressure where it really hurts.”⁵⁴ He reminded the audience that they should unify themselves economically by noting that “individually we are poor when you compare us with white society in America. We are poor. Never stop and forget that collectively, that means all of us together, collectively we are richer than all the nations in the world.”⁵⁵ Both el-Shabazz and King had expressed similar feelings toward the economic injustice that African Americans faced and shared similar solutions to the problem.

Another subject of convergence between el-Shabazz and King is their views on integration. Like many in the NOI, el-Shabazz was against integration, and even after departing from the Nation, he continued to have this belief. He did not believe true integration was achievable, and instead, believed that all of the effort toward integration was tokenism. He asserted that “the 22 million Afro-Americans do not seek either separation or inte-

gration. They seek recognition and respect as human beings... We declare our rights on this earth... to be human beings.”⁵⁶ King’s views on integration were not far from those of el-Shabazz. However, King was a bit more hopeful that integration was possible. Nevertheless, King fully recognized that token integration would not suffice. Most importantly, he emphasized that his views on integration were, in fact, about shared power not the minimal ability to sit at the same counter. For King, integration was “more than something to be dealt with in aesthetic or romantic terms.”⁵⁷ He added, “I think in the past all too often we did it that way... and it ended up as merely adding color to a still predominantly white power structure. What is necessary now is to see integration in political terms where there is sharing of power.”⁵⁸ Definitions of integration varied throughout the Civil Rights Movement, but certainly King and el-Shabazz were not satisfied that only a select few African Americans received their rights.

Throughout most of the second phase of the Civil Rights Movement, members of the Ku Klux Klan and the stereotypical confederate-loving southerner remained the most antagonistic opponents of African Americans. However, both el-Shabazz and King came to see that their biggest opposition was from the white liberals. For el-Shabazz, this was of no surprise. Throughout his leadership, he had voiced his feelings toward white liberalism and saw evidence for his beliefs in America’s political system: “Politically the American Negro is nothing but a football and the white liberals control this mentally dead ball through tricks of tokenism: false promises of integration and civil rights.”⁵⁹ He described the system as being a “profitable game of deceiving and exploiting the political politician of the American Negro.”⁶⁰ He credited the process to white liberals and the cooperation of some civil rights leaders. “These ‘leaders,’” he asserted, “sell out our people for just a few crumbs of token recognition and token gains.”⁶¹ After what King saw as slow progress, he also came to share

similar feelings toward liberal whites. He stated, "over the last few years many Negroes have felt that their most troublesome adversary was not the obvious bigot of the Ku Klux Klan or the John Birch Society, but the white liberal who is more devoted to 'order' than to justice, who prefers tranquility to equality."⁶² As King expanded his civil rights work farther north, he encountered different opposition from northern whites. Toward the end of his life, he came to believe that it was not so much his enemies who were slowing the process for full rights to African Americans but his closet liberal friends who were not willing to fully involve themselves in the plight for African American rights.

Throughout el-Shabazz's public speaking, he consistently exposed American hypocrisy. He argued that the "forefathers committed a crime by bringing our people here to this country...This was a crime and all of those crimes that were committed during 310 years against the black people in this country are the crimes that have come home to roost today on this present generation of whites."⁶³ He boldly challenged America to admit its past atrocity committed against African Americans. King, in his evolving final year, publicly called attention to the hypocrisy in US history. While speaking about the country's most notable figures, King noted that "George Washington, Thomas Jefferson, Patrick Henry, John Quincy Adams, John Calhoun, and Abraham Lincoln were great men, but, that 'but'underscores the fact that not one of these men had a strong, unequivocal belief in the equality of the black man."⁶⁴ In fact, each of those men had either some involvement in the perpetuation of slavery or held the belief that blacks were inferior. King reminded America that "a society is always eager to cover misdeeds with a cloak of forgetfulness, but no society can fully repress an ugly past when the ravages persist into the present."⁶⁵ Both el-Shabazz and King used their platforms to unapologetically speak about the hypocrisy of America.

In early February 1965, el-Shabazz visited Selma, Alabama. During his visit he addressed NBC news reporters and was asked to speak on non-violence as a form of protest. He stated “I believe that it is right to be non-violent with people that are non-violent. But when you’re dealing with an enemy who doesn’t know what non-violence is, as far as I’m concerned, you’re wasting your time.”⁶⁶ In other words, he felt that America was incapable of being non-violent. That incapability was demonstrated several weeks later on March 7, 1965, now remembered as “Bloody Sunday,” when law enforcement officials used brutal force to destabilize a peaceful protest. While el-Shabazz is most remembered for his revolutionary call to freedom “By Any Means Necessary” and his critiques of nonviolence, his militancy never led him actually to use violence personally in the pursuit of his goals. Most of his critics deem him violent despite this fact. Most interpretations of el-Shabazz fail to acknowledge his explanation for disagreeing with non-violent direct action. In one of his final speeches he clarified that “if Martin Luther King was teaching white people to turn the other cheek, then I would say he was justified in teaching black people to turn the other cheek. That’s all I’m against.”⁶⁷ This statement foreshadowed King’s public critique of the war in Vietnam that occurred two years later.

As the Vietnam War continued, and many young black men were being drafted to fight for a country that did little for them, King addressed the War and some of the questions that were being asked of him. In his speech “Beyond Vietnam” on April 4, 1967, he was forced to address the nation for its violence. In this address, he clearly explained, “I could never again raise my voice against the violence of the oppressed in the ghettos without having first spoken clearly to the greatest purveyor of violence in the world today: my own government.”⁶⁸ With those words, King addressed el-Shabazz’s belief that King should urge African American and

white Americans to be mutually non-violent. Moreover, King's view added more creditably to el-Shabazz's statement that African Americans are "dealing with an enemy who doesn't know what non-violence is."⁶⁹

In a perspective drawing, the vanishing point is an imaginary point where two parallel lines meet. King and el-Shabazz represent different streams of black consciousness. When scholarship focuses on their final years, the vanishing point of these two streams of consciousness can be envisioned. At this vanishing point, it becomes clear that they came to similar worldviews and understandings of the struggle for black freedom. It is important to remember both King and el-Shabazz as leaders who were highly involved in a positive outcome of the black freedom movement and not as self-serving individuals detached from the movement of which they were a part. From this understanding, both el-Shabazz and King would advise their followers that the differences between them were not as important as their communal sense of commitment to the struggle for African American advancement and achievement of brotherhood for all. Re-imagining how we interpret their legacies by focusing on their final years can bridge the apparent division. Where these two black streams of consciousness converge will then allow for a more nuanced conversation from which contemporary movements are born.

More than fifty years ago el-Shabazz was assassinated, and today black Americans are still fighting to be recognized as human beings. The "Black Lives Matter" movement has been the latest to emerge in the continuous black freedom struggle. At this time there are many, inside and outside the African American community, who have been scrambling in search of the next leader to emerge and take up the torch that el-Shabazz and King left behind. As we search for those leaders, it is important that we look for leadership that is well informed about the history. "Black Lives Matter" activists and young leaders must understand the importance of taking back

the history of King and el-Shabazz. It should not be the case that King is made into a domesticated icon, while el-Shabazz is completely disregarded rather than recognized as an important figure of that time. We need not re-invent the wheel; we can simply pick up where the black freedom struggle left off. We must not repeat history because of our lack of historical understanding. Not only should we hold everyone accountable for getting the narrative right, but we should also be well informed ourselves. It is clear that something is at stake when a narrative is intentionally created and, by design, leaves out the fact that both leaders evolved to reach a similar point in their political thought. The convergence of King and el-Shabazz teaches us that, as black people, we must work to unify body and thought, recognizing our financial and political power and influence just as our leaders before us have done.

Notes

¹ Tavis Smiley and David Ritz, *Death of a King: The Real Story of Dr. Martin Luther King Jr.'s Final Year*, (Boston, Massachusetts: Little, Brown and Company, 2014), 3.

² Clayborne Carson, "The Unfinished Dialogue of Martin Luther King, Jr. and Malcolm X" (*Souls* 7(1), 2005), 18

³ Malcolm X and Alex Haley, *The Autobiography of Malcolm X* (New York: Grove Press, 1992).

Dr. Martin Luther King Jr., and Clayborne Carson, *The Autobiography of Martin Luther King, Jr.*, 1st Trade ed., (New York: Intellectual Properties Management: Grand Central Publication., 2001). Both Minister Malcolm X and Dr. Martin Luther King's autobiographies are considered autobiographies despite the fact that neither man authorized the final versions.

⁴ Top 10 Greatest Speeches. Accessed June 1, 2015. http://content.time.com/time/specials/packages/article/0,28804,1841228_1841749_1841736,00.html

⁵ Clayborne Carson. "Paradoxes of King Historiography," *OAH Magazine of History*, January 2005, 7-10.

⁶ Haley, *Autobiography of Malcolm X*.

⁷ Eric Pace, "Alex Haley, 70, Author of *Roots*, Dies." February 10, 1992. Accessed June 8, 2015.

⁸ Michael Eric Dyson, *Making Malcolm: The Myth & Meaning of Malcolm X*. New York: Oxford University Press, 1995. p. 144; Manning Marable, *Malcolm X: A Life of Reinvention*. New York: Penguin Books, 2011. p.558.

⁹ Dyson, *Making Malcolm*, p.23

¹⁰ Dyson, *Making Malcolm*.

¹¹ Marable, *Malcolm X: A Life of Reinvention*

¹² A. B. Assensoh and Yvette M. Alex-Assensoh, *Malcolm X: A Biography*, Greenwood Biographies (Santa Barbara, California: Greenwood, 2014).

¹³ Carson, "Paradoxes of King Historiography."

¹⁴ William P Jones, "Working-Class Hero." January 11, 2006. Accessed June 1, 2015.

¹⁵ Carson, "Paradoxes of King Historiography"

¹⁶ Martin Luther King Jr., *Stride Toward Freedom: The Montgomery Story*, New York: Harper, 1958; Martin Luther King Jr., *Why We Can't Wait* New York, Harper and Row, 1964; Martin Luther King Jr., *Where Do We Go From Here: Chaos or Community?*, New York: Harper and Row, 1967.

¹⁷ David J. Garrow, *Bearing the Cross : Martin Luther King, Jr., and the Southern Christian Leadership Conference*, 1st ed. (New York: W Morrow, 1986); Taylor Branch, *Parting the Waters : America in the King Years, 1954-63*, A Spectrum Book (New York: Simon and Schuster, 1988); Taylor Branch, *Pillar of Fire : America in the King Years, 1963-65* (New York, NY: Simon & Schuster, 1998); Taylor Branch, *At Canaan's Edge : America in the King Years, 1965-68* (New York: Simon & Schuster, 2006). "edition": "1st ed.", "source": "Primo", "event-place": "New York", "abstract": "The Montgomery bus boycott, 1955-1956 -- The birth of SCLC, 1957-1959 -- SNCC, the Kennedys, and the freedom rides, 1960-1961 -- Albany and lessons for the future, 1961-1962 -- Birmingham and the March on Washington, 1963 -- The Alabama Project, St. Augustine, and the Nobel Peace Prize, 1963-1964 -- Selma and the Voting Rights Act, 1965 -- Chicago and the "War on slums," 1965-1966 -- The Meredith March, "Black Power," and the Chicago open-housing protests, 1966 -- Economic justice and Vietnam, 1966-1967 -- The poor people's campaign and Memphis, 1967-1968., An account of the life of civil rights leader Dr. Martin Luther King, Jr. based on personal interviews, his personal papers, FBI documents, etc., Pulitzer Prize, Biography, 1987., Includes bibliographical references (pages 725-772

¹⁸ Smiley and Ritz, *Death of a King*.

¹⁹ Dr. Martin Luther King Jr. and Cornel West, *The Radical King*, (Beacon Press, 2015), "Introduction."

²⁰ James Cone, *Martin & Malcolm & America*, (Orbis Books, 1991), "Two Roads To Freedom."

²¹ Marable, *Malcolm X: A Life of Reinvention*, 301-3.

²² Marable, *Malcolm X: A Life of Reinvention*, 302.

²³ Marable, *Malcolm X: A Life of Reinvention*, 484.

²⁴ "Interview with Coretta Scott King." <http://digital.wustl.edu/e/eii/eiiweb/kin5427.0224.089corettascottking.html>. (Accessed March 29, 2015.)

- ²⁵ King, "Beyond Vietnam.", http://mlk-kpp01.stanford.edu/index.php/encyclopedia/documentsentry/doc_beyond_vietnam/. (Accessed March 29, 2015.)
- ²⁶ King "Beyond Vietnam." http://mlk-kpp01.stanford.edu/index.php/encyclopedia/documentsentry/doc_beyond_vietnam/. (Accessed March 29, 2015.)
- ²⁷ King, "Why I am Opposed to the Vietnam War," <http://www.thekingcenter.org/archive/document/mlk-sermon-why-i-am-opposed-war-vietnam>. (Accessed March 29, 2015.)
- ²⁸ King, "Beyond Vietnam (April 4, 1967).", http://mlk-kpp01.stanford.edu/index.php/encyclopedia/documentsentry/doc_beyond_vietnam/. (Accessed March 29, 2015.)
- ²⁹ King., *Where Do We Go from Here: Chaos or Community?*, 191.
- ³⁰ Ibid., 191.
- ³¹ Ibid., 190.
- ³² King, "Beyond Vietnam." Accessed March 29, 2015. http://mlk-kpp01.stanford.edu/index.php/encyclopedia/documentsentry/doc_beyond_vietnam/
- ³³ King, "Beyond Vietnam." (Accessed March 29, 2015.) http://mlk-kpp01.stanford.edu/index.php/encyclopedia/documentsentry/doc_beyond_vietnam/, (Accessed March 29, 2015.)
- ³⁴ Ibid.,
- ³⁵ Smiley and Ritz, *Death of a King*, 20.
- ³⁶ Ibid., 21.
- ³⁷ King, "Beyond Vietnam." (Accessed March 29, 2015.) http://mlk-kpp01.stanford.edu/index.php/encyclopedia/documentsentry/doc_beyond_vietnam/, (Accessed March 29, 2015.)
- ³⁸ "Harry Belafonte Reflects on Working Toward Peace" <http://www.scu.edu/ethics/architects-of-peace/Belafonte/essay.html>, (Accessed March 29, 2015.)
- ³⁹ Ibid.
- ⁴⁰ King, Martin Luther, Jr. "Transforming a Neighborhood into a Brotherhood," Address delivered at the Annual Convention of the National Association of Radio Announcers, August 8, 1967, Atlanta, Ga. (TD) 24 pp. MLKJP-GAMK: Box 122. 670811-000. (Accessed June 3rd 2015.)

⁴¹ Ibid.,

⁴² Ibid.,

⁴³ Malcolm X and Bruce Perry, *Malcolm X: The Last Speeches*, (New York: Pathfinder 1985), "There's a worldwide revolution going on Feb 15, 1965," 128.

⁴⁴ Malcolm X and Benjamin Karim, *The End of White World Supremacy: Four Speeches*, (New York: Arcade Publications, 1989), 26.

⁴⁵ Dr. Martin Luther King Jr., "Dr. King Said It: I'm Black and I'm Proud!" (April 1967). https://www.youtube.com/watch?v=Suw_CQ3zfTY (Accessed June 3rd 2015.)

⁴⁶ Martin Luther King Jr., "Transforming a Neighborhood into a Brotherhood."

⁴⁷ King, *Where Do We Go from Here?*, 43.

⁴⁸ Malcolm X, "Letter to the Egyptian Gazette, August 25, 1964, <http://malcolm-x-files.blogspot.com/2013/07/letter-to-egyptian-gazette-august-25.html>. (Accessed March 30, 2015.)

⁴⁹ Malcolm X, "Letter to the Egyptian Gazette.

⁵⁰ Garrow, *Bearing the Cross*, 563.

⁵¹ Ibid.

⁵² Minister Malcolm X, "Ballot or Bullet" Speech, April 12, 1964.

⁵³ Karim, "The Old Negro and the New Negro", 95-96.

⁵⁴ "I've Been To The Mountaintop," April 3, 1968, <http://www.thekingcenter.org/archive/document/ive-been-mountaintop>. (Accessed March 29, 2015.)

⁵⁵ Ibid.

⁵⁶ Malcolm X, Nan, Richardson, Catherine Chermayeff, and Antoinette White, *Malcolm X Speaks out*, (Kansas City, Mo.: Andrews and McMeel, 1992), 116.

⁵⁷ Garrow, *Bearing the Cross*, 608.

⁵⁸ Ibid.

⁵⁹ Karim, *The End of White World Supremacy*, 133-4.

⁶⁰ Ibid.

⁶¹ Ibid.

⁶² Coretta Scott King, Martin Luther King, and Vincent Harding, *Where Do We Go from Here: Chaos or Community?* King Legacy Series (Boston, MA, USA: Beacon Press, 2010), 88.

⁶³ Karim, *The End of White World Supremacy: Four Speeches*, “The Old Negro and the New Negro” 103.

⁶⁴ King, *Where Do We Go from Here*, 76.

⁶⁵ *Ibid.*, 109.

⁶⁶ NBC News, “Malcolm X Supports Dr. Martin Luther King, Jr.,” February 13, 1965, <https://www.youtube.com/watch?v=2rqVw2ROHF0>. (Accessed June 4, 2015.)

⁶⁷ Perry, *Malcolm X: The Last Speeches*, “There’s a Worldwide Revolution Going On,” February 15, 1965, 149.

⁶⁸ King, “Beyond Vietnam,” http://mlk-kpp01.stanford.edu/index.php/encyclopedia/documentsentry/doc_beyond_vietnam/. (Accessed March 29, 2015.)

⁶⁹ NBC News, “Malcolm X Supports Dr. Martin Luther King, Jr.,” February 13, 1965, <https://www.youtube.com/watch?v=2rqVw2ROHF0>. (Accessed June 4, 2015.)

The Role of Self Doubt and Empathic Accuracy in STEM Fields

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Women have historically been underrepresented in STEM (science, technology, engineering, and math) domains, although their performance has been on a par with that of their male peers (Smith, Lewis, Hawthorne, & Hodges, 2012). One of the main issues in STEM has been retaining women. The analogy of the “leaky pipeline” describes the way in which women in STEM are lost along the way (Alper, 1993; Smith et al., 2012) as they progress through their careers. Research by Drury, Siy and Cheryan (2011) asserts that by using a more egalitarian approach in recruitment of potential STEM students, the chances of recruiting and retaining women might be more successful in these fields. Additionally, women

observant to the gender imbalance found in STEM fields might reflect self-doubt about their ability to be successful in the future within STEM domains (Lewis & Hodges, 2014). There is a need to examine the reasons why women are slowly dropping out of science fields because this trend restricts diversity and limits possible contributions to the future of science.

When making the decision to advance in academic or career fields, people often rely on feedback to gauge their current and future performance. The way a person interprets that feedback, constructive or otherwise, may be a determining factor in one's motivation to continue to pursue an academic or career goal. In order to accurately interpret feedback from others, people need to have a skill called empathic accuracy, which refers to how well people can "read" others' thoughts and feelings (Hodges, Lewis, & Ickes, 2015). In most situations, being able to correctly infer the thoughts of others may be helpful. However, if feedback is perceived negatively, even if perceptions are accurate, it may do more harm than good in terms of motivating persistence.

Previous research has shown that women are often more empathically accurate than men. On the other hand, some studies have revealed no significant gender difference in empathic accuracy. However, although men have performed similarly to women in some studies, they do not perform better than women (Hodges, Laurent, & Lewis, 2011). The implications of heightened empathic accuracy in women, in addition to preconceived ideas of female competence in specific domains, could result in women reading feedback more negatively in fields where they are underrepresented. This might be one reason that women are hesitant to continue to pursue certain male dominated fields such as STEM.

Based on previous studies of empathic accuracy, we predicted women would be more empathically accurate overall in perceiving the feedback they receive in STEM fields in comparison to men. An additional hypothe-

sis focused on the idea that because women are underrepresented in STEM fields, they would report higher levels of self doubt in those fields. Furthermore, because students who score higher in self doubt may be more attentive to feedback if they are unsure of their belonging and ability in the STEM fields, we expected to see that individuals with high self-doubt scores, regardless of gender, would be more empathically accurate in perceiving feedback about their STEM abilities.

Empathic accuracy refers to the extent in which people are correct when inferring the thoughts and feelings of others. On a daily basis, we participate in the process of inferring others' thoughts, and the content of those inferences in turn affects our behaviors and thoughts about ourselves and others. Research suggests that being able to read the thoughts and feelings of others may be beneficial in creating and maintaining social relationships (Hodges et al., 2015). As mentioned above, women are often but not always more empathically accurate than men (Hodges et al., 2011). Traditional gender roles have placed women in positions that encourage reading others and communicating effectively to help build and maintain relationships. This may be one reason women are more skilled at reading the thoughts and feelings of others (Hodges et al., 2011).

Encoding cues in male-dominated environments such as STEM fields could heighten women's vulnerability to perceiving negative feedback, which in turn may impact their feelings of competency. When women interpret feedback as being negative, they show a decreased motivation to put effort into performance (Biernat & Danaher, 2012). In addition, female students hold lower expectations of themselves relative to their male peers, which often results in a decreased effort to overcome academic obstacles (Tan & Pang, 2012). However, women witnessing other successful females in STEM may exhibit increased confidence in their ability to pursue those fields (Stout, Dasgupta, Hunsinger, & McManus, 2011). A study

by Cheryan, Siy, Vichayapai, Drury, and Kim (2011) revealed that women who encountered female role models in STEM fields reported more belief in their future success within those fields. These studies together would suggest that women might be highly perceptive to certain cues encountered in their introductory experiences within STEM fields.

People are motivated to establish a sense of belonging. This innate drive aids us in creating and maintaining social support (Baumeister & Leary, 1995). Belonging is especially important in certain areas, such as academics, where it predicts performance and perseverance (Lewis & Hodges, 2014). According to Lewis and Hodges, a lack of academic belonging may predict feelings of self doubt and uncertainty. A strong sense of belonging, particularly in academia, informs students that they are deserving of the same opportunities as others. When one perceives a sense of inequality relative to one's peers, it can often result in decreased motivation and intentions to persist (Lewis & Hodges, 2014). Women may derive feelings of self doubt from a decreased sense of belonging and therefore may question their place and competence in STEM fields.

Method

Participants:

Undergraduate and graduate students were recruited from STEM fields through email solicitations using various resources on campus (e.g., dean's lists and departmental faculty contacts). Participants were students at the University of Oregon and Oregon State University. Undergraduate participants (72 total; 38 males and 34 females) had an interest in attending graduate school in a STEM field. Also participating in the study were graduate students, both males and females pursuing PhD degrees in the science fields. They were asked to give feedback to the undergraduates. The science fields from which both undergraduate and graduate students

were drawn were physics, computer and information science, biology, chemistry, biochemistry, geology, and engineering.

Procedure:

Dyads consisting of one graduate student and one undergraduate student in the same STEM field were scheduled to hold a 10-minute video recorded conversation about graduate school. The undergraduate students were asked to discuss why they wanted to go to graduate school as well as why they would be qualified candidates. In addition, they were asked to report anything they had done to prepare for a graduate program. The graduate students were instructed to answer questions and give advice to the undergraduate students regarding graduate school. The dyad's conversation was recorded with only the graduate student visible on video.

The undergraduate and graduate students were separated into different rooms to watch the video of the conversation they just had. Graduate students viewed the recording of the interaction while a research assistant stopped the video every 45 seconds. The graduate students were instructed to note the content of their specific thoughts during the original conversation at each 45-second video pause. The undergraduate students also viewed their respective videos, and a research assistant stopped the video every 45 seconds at the same time points it was originally stopped for the graduate students. The undergraduates were asked to guess the thoughts of the graduate students during the original conversation at each 45 second video pause.

Each graduate's thoughts and undergraduate's inferences were later coded for empathic accuracy. Four coders read each reported graduate student thought and rated how closely the undergraduate's inference matched the thought, using a 4-point scale with "0" given to inferences that failed to capture any aspect of the thought and "3" assigned to inferences that

captured the gist of the thought entirely.

During the study, both members of each student dyad were asked about their perceptions of the qualifications of the undergraduate in terms of a future in graduate school. The undergraduate students reported how they thought the graduate student perceived their prospects and how their own prospects compared to other applicants. In addition, undergraduates answered a series of questions using Likert scales (from “very unlikely” to “very likely”) to indicate their future aspirations of going to graduate school (Smith et al., 2013). Finally, the undergraduate students answered questions scoring their feelings of self-doubt, using Oleson and colleagues’ (2000) self doubt scale. The scale uses a 6-point Likert scale (e.g. “strongly disagree” to “strongly agree”) with eight questions inquiring about participants’ general confidence in tasks and abilities.

Results

In the current study, we hypothesized that women would be overall more empathically accurate than men when interpreting feedback in the STEM domains. Empathic accuracy was coded by four different people. Inter-rater reliability was assessed using Cronbach’s alpha, which was found to be 0.90, a high level of inter-rater reliability. We averaged scores from all four of the coders to compute an empathic accuracy score for each inference. A mean empathic accuracy score was then computed for each undergraduate student by averaging across inferences. An independent t-test revealed no significant difference in mean empathic accuracy scores for females ($M = 0.83$, $SD = 0.31$) and for males ($M = 0.81$, $SD = 0.36$), $t(70) = -0.23$, $p = .82$.

Additionally, we had predicted that women would score higher on self doubt compared to men. We computed self doubt scores by averaging across all self doubt items. A t-test revealed that there was also no differ-

ence between mean self doubt scores for females ($M = 3.30$, $SD = 0.77$) and for males ($M = 3.17$, $SD = 0.84$), $t(70) = -.67$, $p = 0.51$.

Finally, we had hypothesized that regardless of gender, individuals who reported higher self doubt would be more empathically accurate. A bivariate Pearson's correlation did not reflect a significant relationship between empathic accuracy and self doubt scores, $r(70) = .09$, $p = .45$.

Discussion

Previous research in empathic accuracy has suggested that women are often more empathically accurate than men. However, in this study, interestingly, we did not find a significant difference in the empathic accuracy scores when comparing men and women. Although some past studies have found no difference when comparing men and women's empathic accuracy, we thought we might see an advantage for women in terms of empathic accuracy in STEM fields, where we expected women might be hyper vigilant when reading feedback. Additionally, we found that there was no significant difference in reported self doubt when comparing genders. Therefore, although women are underrepresented in the STEM fields, in our sample, it was not necessarily reflected in undergraduate students' confidence in their abilities. Furthermore, we found that people who score higher in self doubt were not necessarily more empathically accurate when reading feedback in the STEM fields.

This study has some limitations. For example, we treated all STEM fields the same; however the underrepresentation of women varies somewhat from field to field, and some of the domains we studied may not have had that much gender imbalance. For example, biology is one of the domains that is more equally gender-balanced. Future research may benefit from focusing on domains within STEM that reflect a greater gender imbalance, such as physics and chemistry.

Moreover, because participants volunteered to be in the study, there may have been a bias in those who chose to participate. In particular, female graduate students and male graduate students who were excited about encouraging undergraduates in STEM may have been overrepresented. Undergraduate students, women in particular, may encounter less supportive STEM graduate students in the course of majoring in STEM than they did in this study. Additionally, although it is an established methodology for measuring empathic accuracy (Hodges et al., 2015), the measure of empathic accuracy used in this study was retrospective in nature, and therefore the thoughts the graduate student participants were reporting may not have been precisely what they were thinking at the particular moment they said they were thinking it.

Although self-doubt was not a strong predictor of how women accurately interpreted feedback in STEM fields for this study, it is important to consider that it might still play a part along with other factors that contribute to the loss of women in the STEM pipeline. This study was focused on undergraduate students, which is not necessarily where women are leaking out of the pipeline. Instead greater “leakage” trends are observed more often in graduate schools, post doctoral programs, and STEM careers. Additionally, it is possible that the female undergraduates who participated in our study were already fairly confident in their abilities and highly identified with STEM as they demonstrated the intention to attend grad school in their fields by voluntarily participating in the study. If these female undergraduates were highly identified with STEM, it might have helped to counteract self-doubt.

In closing, people pick up cues in their environment that help them determine a sense of belonging. The more sensitive one is to these factors, the more vulnerable one might be to doubting one’s ability to succeed in certain academic areas (Lewis & Hodges, 2014). We thought that women

might be especially prone to self doubt in the STEM fields, where they continue to be underrepresented. By gaining a deeper understanding of the factors that deter women from persisting in STEM domains, we might be able to find a way to increase recruitment and retention in the STEM fields.

References

- Alper, J. (1993). The pipeline is leaking women all the way along. *Science*, 260, 409-411. doi: 10.1126/science.260.5106.409
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117, 497-529. doi:10.1037/0033-2909.117.3.497
- Biernat, M., & Danaher, K. (2012). Interpreting and reacting to feedback in stereotype-relevant performance domains. *Journal of Experimental Social Psychology*, 48, 271-276. doi:10.1016/j.jesp.2011.08.010
- Cheryan, S., Siy, J. O., Vichayapai, M., Drury, B. J., & Kim, S. (2011). Do female and male role models who embody STEM stereotypes hinder women's anticipated success in STEM? *Social Psychological and Personality Science*, 2, 656-664. doi:10.1177/1948550611405218
- Drury, B. J., Siy, J. O., & Cheryan, S. (2011). When do female role models benefit women? The importance of differentiating recruitment from retention in STEM. *Psychological Inquiry*, 22, 265-269. doi:10.1080/1047840X.2011.620935
- Hodges, S. D., Laurent, S. M., & Lewis, K. L. (2011). Specially motivated, feminine, or just female: Do women have an empathic accuracy advantage? In J.L. Smith, W. Ickes, J. Hall, & S. D. Hodges (Eds.), *Managing interpersonal sensitivity: Knowing when -- and when not -- to understand others* (pp. 59-73). New York: Nova Science Publishers.
- Hodges, S. D., Lewis, K. L., & Ickes, W. (2015). The matter of other minds: Empathic accuracy and the factors that influence it. In P. Shaver, M. Mikulincer (Eds.), J. A. Simpson, & J. Dovidio (Assoc. Eds.), *APA handbook of personality and social psychology: Vol 2. Interpersonal relations and group processes* (pp. 319-348). Washington, DC: American Psychological Association.
- Lewis, K. L., & Hodges, S. D. (2014). Expanding the concept of belonging in academic domains : Development and validation of the Ability Uncertainty Scale. *Learning and Individual Differences*, 37, 197-202. doi:10.1016/j.lindif.2014.12.002
- Oleson, K. C., Poehlmann, K. M., Yost, J. H., Lynch, M. E., & Arkin, R. M. (2000). Subjective overachievement: Individual differences in self-doubt

and concern with performance. *Journal of Personality*, 68, 491–524.

Smith, J. L., Lewis, K. L., Hawthorne, L., & Hodges, S. D. (2012). When trying hard isn't natural: Women's belonging with and motivation for male-dominated STEM fields As a Function of Effort Expenditure Concerns. *Personality and Social Psychology Bulletin*, 39, 131–143. doi:10.1177/0146167212468332

Stout, J. G., Dasgupta, N., Hunsinger, M., & McManus, M. a. (2011). STEM-ing the tide: Using ingroup experts to inoculate women's self-concept in science, technology, engineering, and mathematics (STEM). *Journal of Personality and Social Psychology*, 100, 255–270. doi:10.1037/a0021385

Tan, S. H., & Pang, J. S. (2012). Sticks and stones will break my bones but failure feedback may not hurt me: gender differences in the relationship between achievement motive, coping strategies and environmental mastery. *Educational Psychology*, 32, 373–388. doi:10.1080/01443410.2012.662148

Sociability Gap between Chinese American Mothers and their Children: Consequences of Gap on Young School Age Children's Adjustment

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Asian Americans are known as the “model minority,” an idea that views Asian Americans as academically gifted, wealthy, and living “the American dream,” so that they never need any assistance (Qin, 2008; Kobayashi, 1999). However, recent research suggests that Asian American children may be paying socioemotional costs (Lorenzo, Frost, & Reinherz, 2000; Qin, Way, & Mukherjee, 2008). For example, Asian American youth are more likely to have increased depressive symptomatology, withdrawn behavior, and social problems (Lorenzo et al., 2000). Studies with adolescents have examined the role of parent-child relationships (Costigan, Hua, & Su, 2010; Qin, 2008) and, more specifically, parent-child acculturation gaps in relation to these socioemotional costs (Costigan & Dokis, 2006; Juang, Syed, & Takagi, 2007; Lim, Yeh, Liang, Lau, & McCabe, 2008).

The acculturation gap itself is the different rates at which immigrant parents and their children typically adjust to their host culture (Jung, 2013; Telzer, 2011). The acculturation gap-distress model is the idea that socio-

emotional differences between parent and child, created by the acculturation gap, results in family conflict and child maladjustment (Telzer, 2011). Most studies have found that the acculturation gap is associated with socioemotional costs for immigrant youth (Chen et al., 2014; Costigan & Dokis, 2006), although other notable researchers have failed to find any association (Lau et al., 2005; Gil, Vega, Dimas, 1994). The acculturation gap has typically been described and defined in past studies with multiple domains, including language, social relationships, and ethnic interactions (Suinn, Kathryn, Lew, & Vigil, 1987). While many of these domains involve an element of sociability, past research has generally not investigated aspects of a person's sociability when considering how gaps between generations might contribute to maladjustment. Sociability is defined here as "the preference to be with people and to interact with others" (Elovainio et al., 2015, p. 204). Past research has also largely neglected to look at the acculturation gap's effect on younger populations, instead focusing mostly on Asian American adolescents and their parents.

This study investigates how an acculturation gap, defined by the difference in dimensions of sociability between Chinese American mothers and their 5- to 7-year-old children, affects the children's adjustment in their early school years. We are investigating whether these "model minority" children are paying a price following the transition to school, despite the other perceived benefits, such as academic success, that they have over children of other minorities.

Literature Review

Acculturation, Acculturation Gap, and the Acculturation Gap-Distress Model

As Telzer (2011) discusses, acculturation is the intricate process by which immigrants adapt to their new host culture. Through this adaptation,

their heritage values, beliefs, and behaviors may change. The challenge that immigrant individuals face is retaining the values of their heritage culture while also accepting the values of their host culture. This becomes even more complicated when considered within multi-generational familial contexts that involve immigrant parents and their children adjusting to the host culture in different ways and at different rates. When such inter-generational differences occur, the result is known as the acculturation gap (Costigan & Dokis, 2006; Telzer, 2011).

As briefly introduced, the acculturation gap-distress model describes conditions when maladjustment occurs because of the different rates at which immigrant parents, as compared to their children, adapt to a new culture (Telzer, 2011). Multiple approaches to the model have been taken, as Telzer (2011) points out in her integrative review. Some studies have chosen to look at how parents and children have acculturated just to the host culture (Crane, Ngai, Larson, & Hafen, 2005; Juang et al., 2007; Tardif & Geva, 2006), while others have chosen to look at acculturation in relation to both the host and heritage cultures (Costigan & Dokis, 2006; Lim et al., 2008; Liu et al., 2009). Also, researchers have proposed many different ways to measure acculturation (e.g., language proficiency, friendship, traditions, and values). Some studies have chosen to focus on one domain (Juang et al., 2007; Liu et al., 2009), while others have chosen to look at multiple domains (Costigan & Dokis, 2006; Crane et al., 2005). Outcomes, defined broadly in the model as family conflict and child maladjustment, are measured in diverse ways. Some common outcome variables include depression (Costigan & Dokis, 2006; Crane, Ngai, Larson, & Hafen, 2005; Juang et al., 2007), family conflict (Costigan & Dokis, 2006; Tardif & Geva, 2006) and parenting behaviors (Buki, Ma, Strom, & Strom, 2003; Weaver & Kim, 2008).

Because of the many different ways that researchers have approached

the acculturation gap-distress model, the various findings often conflict with other literature. Overall, most studies have found that an acculturation gap is correlated with some maladjustment, both for immigrants in general (Birman, 2006; Smokowski, Rose, & Bacallao, 2008) and, more specifically, for Chinese Americans (Tardif & Geva, 2006; Weaver & Kim, 2008). As a result, we hypothesize that the larger the gap between parent and child, the worse the maladjustment for the child. However, as Telzer (2011) argues, much more research must be done with the acculturation gap-distress model because, as it stands, findings indicate that the model oversimplifies a complex issue. Rather than simply a difference in acculturation between parent and child being the sole reason that conflicts arise, acculturation may influence other factors that also affect child adjustment. Our study approaches this model by looking at different levels of sociability between mother and child as one of these possible factors.

Acculturation and Sociability

Although sociability as it relates to the acculturation gap has been neglected in past literature, it has been acknowledged as an important part of acculturation through other, albeit minor, means. Global acculturation scales have often included measures of social relationships. The Cultural and Social Acculturation Scale (CSAS; Chen & Lee, 1996) is one example, and it has a subscale about social relationships. The Suinn-Lew Asian Self-Identity Acculturation Scale (SL-ASIA; Suinn et al., 1987) has a subscale for friendship/community choices similar to the CSAS's subscale for social relationships. Both scales seek to establish the ethnicity respondents choose to interact with most. Social interactions have always been a part of looking at acculturation, but sociability itself, to our knowledge, has never been used to conceptualize the acculturation gap. This oversight is surprising in that sociability is a measure of a core social characteristic that

greatly influences how open individuals are to others of a given culture. In essence, sociability defines directly what the above scales try to measure indirectly. Social relations are an important factor to examine because they are an essential way to access any given culture. After all, becoming a part of a culture means willingly interacting with individuals within that culture, and that is the definition of sociability (Elovainio et al., 2015).

In terms of possible links to maladjustment, individual differences in sociability levels have also been linked to an individual's level of depression (Elovainio et al., 2015), a symptom that has been found to be significantly correlated to the acculturation gap (Costigan & Dokis, 2006; Crane et al., 2005). Our study explores whether there is a link between acculturation and sociability—specifically, the difference between mother-child sociability levels—which may in turn explain child adjustment, including levels of depression. Asian American youth, in particular, have difficulty with depression and other issues of adjustment, despite the stereotype of being the “model minority” (Qin, 2008).

The Reality of “Model Minority” Youth

It is not so much that the “model minority” idea is completely unfounded, but rather that it reduces Asian Americans, with all their successes and flaws, down to three generalized characteristics. From these three characteristics comes one oversimplified conclusion: as the “model minority,” Asian Americans are academically gifted, eventually become wealthy through successful careers, and are living “the American dream” (Qin, 2008; Kobayashi, 1999). Therefore, they do not need any sort of assistance.

Indeed Asian Americans hold the highest high school GPAs on average in the United States and have been doing so consistently for at least the last three decades (National Assessment of Educational Progress, 2009). Aca-

ademic success and feelings about academic competence have commonly been used in research as positive signs of child adjustment (Liu, Benner, Lau, & Kim, 2009; Measelle, Ablow, Cowan, & Cowan, 1998). Studies of Asian American adolescents suggest that, despite their academic success, they tend to have higher levels of difficulty coping with negative emotions as compared to Caucasian American adolescents (Abe & Zane, 1990). A study by Cummings, Case, Ji, Chae, and Druss (2014) found that Asian American adolescents are less likely than Caucasian Americans to endorse thoughts of depression, thoughts of suicide, or attempts at suicide as reasons to seek out mental health treatment. In addition to having difficulties dealing with such negative feelings, Asian American adolescent girls had the highest level of depression among all races, as well as the second highest rate of suicide in 2009 among all women between 15-24 years of age (National Center for Health Statistics, 2012, as cited in Hahm, Gonyea, Chiao, & Koritsanszky, 2014).

The body of past research suggests that issues related to internalizing emotions and depression are, in general, likely to play some role in higher rates of suicide. Acculturation gaps tend to be correlated with depression in adolescence in many studies, including those of Costigan and Dokis (2006) and Crane et al. (2005). It is particularly important to examine whether acculturation gaps correlate with internalizing problems in young children, as any family interventions/parental trainings can be implemented at an early age. This in turn may help lower the suicide rates and depression levels in adolescent Chinese Americans.

Young Children, their Social Development, and Acculturation

As important as it is to understand the problems of adolescents, it is also vital to examine why, developmentally, five to seven is a critical age for this study, outside of simply intervening for issues that may arise years

later. In the United State, children between five and seven years old are either just entering school or have been in school only for a year or two. In the context of culture, this is the first major introduction to any culture that children face other than the one they are exposed to at home. Developmentally, because they are now regularly in a setting with peers, children aged five to seven begin to learn social skills, including sharing (Malti, Gummerum, Keller, Chaparro, & Buchmann, 2012). Malti et al. (2012) found that at age six, children's feelings of social acceptance, which is a part of sociability as it is based in each child's perception of acceptance by peers, affects their sharing at age seven. Clearly, children at this age are already sensitive to the acceptance of their peers from the host culture and those feelings begin to affect future social behaviors. Our study focused on this critical period when children begin to build the foundations of their social interactions and when influences from environments outside the home may begin to affect their sociability.

There is also the issue that researchers simply have not closely examined acculturation and the acculturation gap for this age group. In the few studies that have examined the parent-child acculturation gap's effect on children, most chose to focus on adolescents instead of younger children. There are a variety of reasons for that emphasis, including the fact that there are limited ways to ensure younger children accurately self-report their experiences (Measelle et al., 1998). Instead, the limited studies that have looked at younger age groups in relation to acculturation have had parents report most of the child measures with a few done by the children's teachers as well (Chen et al., 2014). Therefore, it is clear that more research is needed in order to understand the effect of the acculturation gap on Chinese American parents and young children, a population that has been given little attention in relation to acculturation. Of the little research that has been done, no study has looked at the issue of acculturation using self-reports of early elementary school children.

Current Study

The present study investigates how, with mothers’ acculturation as a predictor, the sociability gap between Chinese American mothers and their children is associated with children’s adjustment in their early school years. We examined these associations to detect whether “model minority” children are paying a price following the transition to school. Specifically, we sought to understand whether a mother’s acculturation levels were associated with her and her child’s sociability. To the extent that a mother’s and child’s sociability levels were different, especially if this difference occurred because of acculturative processes, we expected that such a mismatch, or gap would hold negative implications for the child. In sum, this study investigated the extent to which a gap in sociability between the mother and the child anticipates the child’s socioemotional adjustment (see Figure 1). We hypothesized that the more mothers were acculturated, whether to their heritage or host culture, the smaller the sociability gap between mother and child, and that a smaller sociability gap would, in turn, be associated with less child maladjustment.

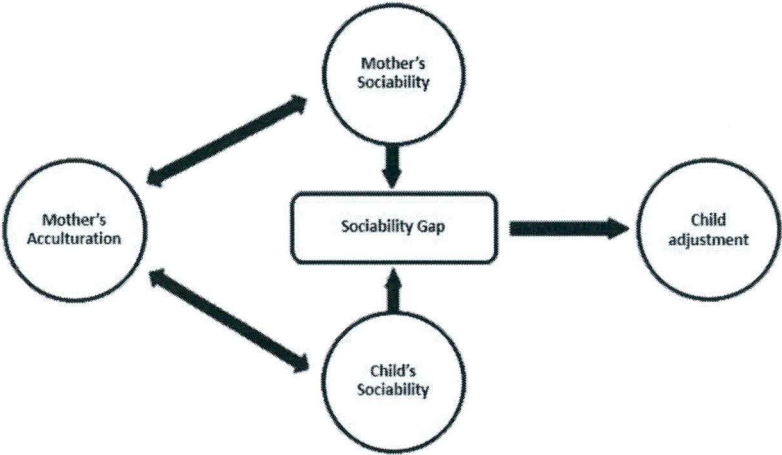


Figure 1: Sociability Gap Diagram

Method

Participants and Procedures

The sample comprised 70 Chinese American children (36 female, 34 male) and their mothers from the San Francisco Bay Area. This sample was taken from a larger dissertation study examining the emotional experience of Chinese American children as compared to that of Caucasian American children (Liu, 2008).

Measures

Mothers' acculturation. Mothers reported their acculturation on two 37-item versions of the General Ethnicity Questionnaire: the Chinese and American versions (GEQ-C and GEQ-A; Tsai, Ying, & Lee, 2000). Those measures assessed the degree of affiliation with each culture. Mothers were asked to rate their endorsement of language use and proficiency, social affiliation, cultural pride, participation in cultural activities, and food preference in both Chinese and American cultures using a 5-point Likert scale (1 being "strongly disagree," and 5 being "strongly agree"). The Chinese version also asked about exposure to Chinese culture, and the American version asked about preference of media in English. The internal consistencies for both scales were high ($\alpha = .916$ for the GEQ-C and $\alpha = .923$ for the GEQ-A).

Mother sociability scores. In addition to answering questions on the GEQ-C and the GEQ-A, mothers also reported their acculturation on the Suinn-Lew Asian Self Identity Acculturation (SL-ASIA; Suinn et al., 1987). Select items from the SL-ASIA and GEQ-C and GEQ-A were used to measure sociability. These items were sorted into either the introversion/extraversion or social acceptance dimension of sociability. The introversion/extraversion dimension was used in this study to determine

how open participants were to being involved within their community. The social acceptance dimension, on the other hand, looked at whether participants felt accepted by others within their community. For example, a pair of items from the introversion/extraversion dimension were “I go to places where people are Chinese” and “I go to places where people are American” (GEQ-C and GEQ-A; Tsai et al., 2000). Mothers who scored higher on this pair of items were considered more highly sociable on that dimension, as they associated with both major cultures of their identity. Internal consistencies were rather low for all dimensions ($\alpha = .467$ for the introversion/extraversion dimension, $\alpha = .429$ for the social acceptance dimension, and $\alpha = .622$ for sociability in general). These low internal consistencies are likely the result of our study being unable to tap into the different reasons behind similar results.

Child sociability scores. Child sociability was measured using the Berkeley Puppet Interview Symptomatology scales (BPI-S; Measelle et al., 1998), a semi-structured interview for measuring children’s self-reported level of depression, over anxiousness, asocial behavior with peers, separation anxiety, and social inhibition.

The BPI-S used two identical, gender neutral puppy puppets named Iggy and Ziggy to interview the children. A trained interviewer had Iggy and Ziggy offer opposing statements about themselves, and then had the puppets ask the children to provide responses about their own related self-perceptions. For example, one puppet would say “I’m a sad kid,” and the other puppet would say, “I’m not a sad kid.” Both puppets would then simultaneously ask the child, “How about you?” Children were able to respond either verbally or in a gestural manner in order to keep the child as comfortable as possible with the process. The exchange was videotaped and coded in a laboratory on a 7-point Likert scale, with 1 indicating very negative self-perception or severe distress in reported symptomatology

(i.e., "I'm always sad.") and 7 indicating very positive self-perception or no symptomatology (i.e., "I'm never a sad kid").

Select items were categorized under the introversion/extraversion and social acceptance dimensions. An example item from the introversion/extraversion dimension is "at recess, I'd rather do things with other kids./ At recess, I'd rather do things by myself." In contrast, the example item "I wish people liked me more./ I don't wish people liked me more" helped to illustrate the dimension of social acceptance (BPI-S; Measelle et al., 1998). Internal consistencies ranged from $\alpha = .915$ for the introversion/extraversion dimension, to $\alpha = .494$ for the social acceptance dimension, resulting in $\alpha = .827$ for sociability in general.

Sociability gap scores. Three mother-child sociability gap scores were calculated using the parents' and the children's scores on the two dimensions of sociability, introversion/extraversion and social acceptance, as well as sociability in general. Again, mothers' sociability was measured from select items of the GEQ-C, GEQ-A (Tsai et al., 2000) and SL-ASIA (Suinn et al., 1987) while children's sociability was measured by responses to BPI (Measelle et al., 1998).

Child maladjustment. Child maladjustment items were measured using the Berkeley Puppet Interview Symptomatology scales (Measelle et al., 1998) on the subscales of Depression, Overanxiousness, and Asocial with Peers. The BPI scale was reversed for child maladjustment symptoms, so that on the 7-point Likert scale, 1 indicates very positive self-perception in reported symptomatology and 7 indicates very negative self-perception symptomatology. Internal consistencies ranged from .396 to .524 (Depression $\alpha = 0.524$; Overanxious $\alpha = 0.396$; Asocial with Peers $\alpha = .505$), which were a bit low.

Results

Descriptive Statistics

Table 1 presents means and standard deviations of the participants' demographic characteristics. The gender breakdown of the children was nearly equal, with 36 girls and 34 boys. On average, the children are 6.5 years old ($SD=0.8$). All mothers and fathers in the sample were of Chinese descent, 95% of whom were born in Asia, and 5% of whom were born in the US. As for the Chinese American children, approximately 92% of them were born in the US while approximately 8% were born in Canada, Taiwan, or Hong Kong. All children immigrated to the US before they turned two. The Chinese American mothers had lived in the United States for an average of eight years at the time the data was collected.

Participants self-identified as Chinese American, and their levels of acculturation to both Chinese and American culture were assessed.

Mother-Child Sociability Gap Scores

Mothers' and children's scores were averaged along each dimension of sociability, respectively. This left each mother-child dyad with six means, creating three pairs along introversion/extraversion, social acceptance, and sociability in general. Each mean was standardized into z scores in order to have all scores comparable across different measurements. Both difference and regression methods were then used to analyze the gap score. Mothers' standardized averages were taken from their children's z scores, which resulted in three difference sociability gap scores for each mother-child dyad. Similarly, three standardized residual scores were generated with mother z scores as the independent variable and child z scores as the dependent variable.

Our study chose to look at both difference and regression methods, as

Table 1: Demographics Means and Frequencies

Variables	Chinese American (n = 70)
Gender	
Female	36 (51.4%)
Male	34 (48.6%)
Child's Age (months)	77.5 (9.0)
Child's Birthplace	
United States	65 (92.8%)
China	1 (1.4%)
Taiwan	2 (2.9%)
Hong Kong	1 (1.4%)
Canada	1 (1.4%)
Mother's Birthplace	
United States	3 (4.3%)
China	15 (21.4%)
Taiwan	49 (70.0%)
Hong Kong	1 (1.4%)
Malaysia	1 (1.4%)
Vietnam	1 (1.4%)
Father's Birthplace	
United States	4 (5.7%)
China	16 (22.9%)
Taiwan	44 (62.9%)
Hong Kong	4 (5.7%)
Malaysia	1 (1.4%)
Vietnam	1 (1.4%)
Community	
% of Mother's Friends with Same Ethnicity	83.1 (14.3)
% of Child's Friends with Same Ethnicity	68.7 (24.4)
Acculturation	
American Culture	3.09 (.50)
Chinese Culture	3.66 (.49)
Gap Score	
Introversion/Extraversion Difference	-.22 (1.12)
Introversion/Extraversion Standardized Residual	.00 (.99)
Social Acceptance Difference	.00 (.91)
Social Acceptance Standardized Residual	.00 (.99)
Sociability Difference	-.22 (1.12)
Sociability Standardized Residual	.00 (.99)
Child Adjustment	
Depression	3.49 (.66)
Over anxiousness	2.90 (.66)
Separation Anxiety	3.11 (.63)
Asocial w/ Peers	2.48 (.63)
Social Inhibition	3.52 (.54)
General Internalizing	3.12 (.42)

the former primarily examines the gap of each dyad but with little consideration for the sample at large, while the latter compares each dyad to the sample's results at large. The data in Table 2 reveals that the difference scores and standardized residual scores were strongly correlated on all dimensions of sociability. This indicated that both methods of examining the gap were valid, as compared to one another.

Acculturation and Sociability Gap Scores

Table 2 also lays out the correlations between each gap score from each dimension of sociability to the mothers' Chinese and American acculturation. It indicates that there were no significant correlations between a mother's acculturation to Chinese culture and mother-child sociability gaps, on any dimension. However, there was a strong negative correlation between a mothers' acculturation to American culture and the mother-child sociability gap along the social acceptance dimension when looking at both the difference ($r(65) = -.350, p < .01$) and standardized residual scores ($r(65) = -.339, p < .01$).

As mothers acculturate more to American culture, the smaller the gap between mother and child's sociability becomes when examining it along the social acceptance dimension.

Sociability Gap Scores and Child Maladjustment

Table 3, which depicts correlations between the sociability gap scores and child maladjustment subscales, shows that both the difference sociability gap score and the standardized residual sociability gap score were significantly negatively correlated with general internalizing symptoms (see columns 3a and 3b in Table 3). This result indicated that the larger the sociability gap between mother and child, the less the children suffered from maladjustment symptoms. This particular result, however, seemed to have been driven mostly by the social acceptance dimension of socia-

bility (see columns 2a and 2b in Table 3) which was strongly negatively correlated with depression and negatively correlated with general internalizing symptoms. Thus, the larger the social acceptance gap between mother and child, in particular, the less the children suffered from maladjustment symptoms, and more specifically, the less the children suffered from depression. The introversion/extraversion dimension was strongly negatively correlation with the asocial with peers subscale but was not correlated with general internalizing (columns 1a and 1b in Table 3). The over anxiousness subscale was found to be insignificantly correlated to all gap scores.

Discussion

This study aimed to see how, with mothers' acculturation as a predictor, the sociability gap between Chinese American mothers and their children affects the children's adjustment in their early school years. We hypothesized that the more mothers are acculturated to either their heritage culture or their host culture, the smaller the sociability gap would be between mother and child, and this would, in turn, be associated with less child maladjustment. Evidence only partially supported this hypothesis. Mothers' Chinese level of acculturation was not significantly correlated to any dimension of sociability gap between her and her child. Mothers' American acculturation level, in our study, was a significant predictor of mother-child sociability gap, though only along the social acceptance dimension. Although our hypothesis was based on the fact that most of past literature found significant effects of gaps in both host and heritage cultures of diverse populations (Kim, Chen, Li, Huang, & Moon, 2009; Lim et al., 2008), a few studies found that only the heritage culture was significant (Costigan & Dokis, 2006), and a few others found that only the host culture played a role in the gap (Birman, 2006).

Table 2: Mothers' Acculturation Correlations with Sociability Gap Scores

Variables		1a.	1b.	2a.	2b.	3a.	3b.	4.	5.
1a. Introversion/Extraversion Difference	Pearson Correlation	1	.889**	.173	.133	.849**	.795**	.024	-.088
	Sig. (2-tailed)		.000	.167	.292	.000	.000	.852	.489
	N	65	65	65	65	65	65	61	64
1b. Introversion/Extraversion Standardized Residual	Pearson Correlation	.889**	1	.007	.002	.795**	.905**	.133	.048
	Sig. (2-tailed)	.000		.956	.985	.000	.000	.307	.707
	N	65	65	65	65	65	65	61	64
2a. Social Acceptance Difference	Pearson Correlation	.173	.007	1	.890**	.553**	.309*	.014	-.350**
	Sig. (2-tailed)	.167	.956		.000	.000	.012	.916	.004
	N	65	65	70	70	65	65	62	65
2b. Social Acceptance Standardized Residual	Pearson Correlation	.133	.002	.890**	1	.553**	.347**	.051	-.339**
	Sig. (2-tailed)	.292	.985	.000		.000	.005	.695	.006
	N	65	65	70	70	65	65	62	65
3a. Sociability Difference	Pearson Correlation	.849**	.795**	.553**	.533**	1	.901**	.004	-.141
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.977	.265
	N	65	65	65	65	65	65	61	64

3b. Sociability Standardized Residual	Pearson Correlation	.795**	.905**	.309*	.347**	.901**	1	.118	.014
	Sig. (2-tailed)	.000	.000	.012	.005	.000		.366	.913
	N	65	65	65	65	65	65	61	64
4. Mother Acculturation to Chinese Culture (GEQ-C)	Pearson Correlation	.024	.133	.014	.051	.004	.118	1	-.403**
	Sig. (2-tailed)	.852	.307	.916	.695	.977	.366		.001
	N	61	61	62	62	61	61	62	62
5. Mother Acculturation to American Culture (GEQ-A)	Pearson Correlation	-.088	.048	-.350**	-.339**	-.141	.014	-.403**	1
	Sig. (2-tailed)	.489	.707	.004	.006	.265	.913	.001	
	N	64	64	65	65	64	64	62	65

** . correlation is significant at .01 level (two-tailed)
* . correlation is significant at .05 level (Two-tailed)

Table 3: *Sociability Gap Scores Correlations with Child Maladjustment subscales*

Variables		Depression	Overanxious	Asocial w/ Peers	General Internalizing
1a. Introversion/ Extraversion Difference	Pearson Correlation	.169	.081	-.634**	-.156
	Sig. (2-tailed)	.179	.520	.000	.215
	N	65	65	65	65
1b. Introversion/ Extraversion Standardized Residual	Pearson Correlation	.204	.100	-.752**	-.169
	Sig. (2-tailed)	.104	.430	.000	.177
	N	65	65	65	65
2a. Social Acceptance Difference	Pearson Correlation	-.396**	-.090	-.129	-.381*
	Sig. (2-tailed)	.001	.475	.305	.002
	N	65	65	65	65
2b. Social Acceptance Standardized Residual	Pearson Correlation	-.424**	-.081	-.152	-.398*
	Sig. (2-tailed)	.000	.519	.226	.001
	N	65	65	65	65
3a. Sociability Difference	Pearson Correlation	-.057	.031	-.684**	-.367**
	Sig. (2-tailed)	.654	.519	.000	.003
	N	65	65	65	65
3b. Sociability Standardized Residual	Pearson Correlation	-.003	.068	-.782**	-.343**
	Sig. (2-tailed)	.984	.590	.000	.005
	N	65	65	65	65

**. correlation is significant at .01 level (two-tailed)

*. correlation is significant at .05 level (Two-tailed)

The mother-child social acceptance gap was found, in turn, to be a significant predictor of children's internalizing problems, although this significance was driven in large part by the gap's effect on depression. This study provided evidence that the less Chinese American mothers are acculturated to American culture, the larger the difference will be between their level of sociability along the social acceptance dimension and their children's level of sociability. This larger gap correlated with less child depression.

These results are surprising because, although a gap was found, it was found to be negatively correlated with child maladjustment. While some past literature has found no correlation between a gap and child maladjustment (Lau et al., 2005; Smokowski et al., 2008), to our knowledge, no research has found that the larger the gap, the better child outcomes. The results here may have to do with this study being the first to look at the sociability gap in particular. It could be that it is more beneficial for children to feel more social acceptance than their mothers who are less acculturated to American culture, so that the children feel less depressed and are less socially inhibited. Perhaps mothers who are less socialized to American culture can invest more time in their children, which in turn may reduce children's symptoms of maladjustment. Another issue related to this study is that it did not examine the fathers' acculturation and sociability levels. More investigation into the effect of acculturation on sociability levels of diverse families and subsequent consequences for their children needs to occur. Because the result from this study was vastly different from the results of past studies focused on the acculturation gap's effect on adolescents, it would be beneficial to invest in a future longitudinal study. It is possible, and even likely, that acculturation and sociability gaps have different implications for children from diverse families as the children get older.

Furthermore, it is important to keep in mind that participants for this study were recruited from the San Francisco Bay Area, an area with a large community of Chinese Americans. These results may not be generalizable to other areas with smaller Chinese American communities.

The creation of mothers' sociability scores by averaging mothers' results on items across measures of both Chinese acculturation and American acculturation was another limitation of this study as indicated by the fairly low internal consistencies. These methods allow the same scores to be derived in different ways, which makes the middle ranges of these variables impossible to interpret. Consequently, this limitation caused mothers' internal consistency scores to be fairly low. Future studies would have to create a sociability scale for sociability specifically, rather than taking items from measures of acculturation. Internal consistencies for BPI subscales were also somewhat low, indicating that these Chinese American children are likely interacting with BPI items differently than populations previously examined with that scale. Therefore, it is essential that any future study wishing to utilize the BPI with Chinese American children must find a way to adjust BPI items in order to improve how these children interact with such items.

Overall, our results indicated clearly that acculturation has a potential effect on mother-child differences—in this case, a sociability gap—and subsequently one that can have an impact on child adjustment. This result, at least, is congruent with the majority of past studies done on the acculturation gap. Thus, our findings support and highlight the importance of working with Chinese American families as a whole when trying to help their children deal with issues such as depression, and that differences caused by acculturation may play a hand in any maladjustment issues.

References

- Abe, J. S., & Zane, N. W. S. (1990). Psychological maladjustment among Asian and White American college students: Controlling for confounds. *Journal of Counseling Psychology*, 37(4), 437–444. doi:10.1037/0022-0167.37.4.437
- Birman, D. (2006). Acculturation Gap And Family Adjustment: Findings With Soviet Jewish Refugees in the United States and Implications for Measurement. *Journal of Cross-Cultural Psychology*, 37(5), 568–589. doi:10.1177/0022022106290479
- Buki, L. P., Ma, T.-C., Strom, R. D., & Strom, S. K. (2003). Chinese immigrant mothers of adolescents: self-perceptions of acculturation effects on parenting. *Cultural Diversity & Ethnic Minority Psychology*, 9(2), 127–140. doi:10.1037/1099-9809.9.2.127
- Chen, S. H., Hua, M., Zhou, Q., Tao, A., Lee, E. H., Ly, J., & Main, A. (2014). Parent-child cultural orientations and child adjustment in Chinese American immigrant families. *Developmental Psychology*, 50(1), 189–201. doi:10.1037/a0032473
- Costigan, C. L., & Dokis, D. P. (2006). Relations between parent-child acculturation differences and adjustment within immigrant chinese families. *Child Development*, 77(5), 1252–1267. doi:10.1111/j.1467-8624.2006.00932.x
- Costigan, C. L., Hua, J. M., & Su, T. F. (2010). Living up to Expectations: The Strengths and Challenges Experienced by Chinese Canadian Students. *Canadian Journal of School Psychology*, 25(3), 223–245. doi:10.1177/0829573510368941
- Crane, D. R., Ngai, S. W., Larson, J. H., & Hafen, M. (2005). The influence of family functioning and parent-adolescent acculturation on North American Chinese adolescent outcomes. *Family Relations*, 54(3), 400–410. doi:10.1111/j.1741-3729.2005.00326.x
- Cummings, J. R., Case, B. G., Ji, X., Chae, D. H., & Druss, B. G. (2014). Racial / Ethnic Differences in Perceived Reasons. *Journal of the American Academy of Child & Adolescent Psychiatry*, 53(9), 980–990. doi:10.1016/j.jaac.2014.05.016
- Elovainio, M., Jokela, M., Rosenström, T., Pulkki-Råbäck, L., Hakulinen, C., Josefsson, K., ... Keltikangas-Järvinen, L. (2015). Temperament and depressive symptoms: What is the direction of the association? *Journal of Affective Disorders*, 170, 203–12. doi:10.1016/j.jad.2014.08.040

- Hahm, H. C., Gonyea, J. G., Chiao, C., & Koritsanszky, L. A. (2014). Fractured Identity: A Framework for Understanding Young Asian American Women's Self-harm and Suicidal Behaviors. *Race and Social Problems*, 6(1), 56–68. doi:10.1007/s12552-014-9115-4
- Juang, L. P., Syed, M., & Takagi, M. (2007). Intergenerational discrepancies of parental control among Chinese American families: Links to family conflict and adolescent depressive symptoms. *Journal of Adolescence*, 30(6), 965–975. doi:10.1016/j.adolescence.2007.01.004
- Jung, M. (2013). *The Role of an Intergenerational Acculturation Gap in the Adjustment of Immigrant Youth: A Meta-Analysis*. University of Tennessee. Retrieved from http://trace.tennessee.edu/utk_graddiss/2584/
- Kim, S. Y., Chen, Q., Li, J., Huang, X., & Moon, U. J. (2009). Parent-child acculturation, parenting, and adolescent depressive symptoms in Chinese immigrant families. *Journal of Family Psychology*, 23(3), 426–437. doi:10.1037/a0016019
- Lau, A. S., McCabe, K. M., Yeh, M., Garland, A. F., Wood, P. a, & Hough, R. L. (2005). The acculturation gap-distress hypothesis among high-risk Mexican American families. *Journal of Family Psychology : JFP : Journal of the Division of Family Psychology of the American Psychological Association (Division 43)*, 19(3), 367–375. doi:10.1037/0893-3200.19.3.367
- Lim, S.-L., Yeh, M., Liang, J., Lau, A. S., & McCabe, K. (2008). Acculturation Gap, Intergenerational Conflict, Parenting Style, and Youth Distress in Immigrant Chinese American Families. *Marriage & Family Review*, 45(1), 84–106. doi:10.1080/01494920802537530
- Liu, C. H. (2008). *The Emotion Experience of Chinese American and European American Children*. University of Oregon.
- Liu, L. L., Benner, A. D., Lau, A. S., & Kim, S. Y. (2009). Mother-adolescent language proficiency and adolescent academic and emotional adjustment among Chinese American families. *Journal of Youth and Adolescence*, 38(4), 572–586. doi:10.1007/s10964-008-9358-8
- Lorenzo, M. K., Frost, A., & Reinherz, H. Z. (2000). Social and Emotional Functioning of Older Asian American Adolescents. *Child & Adolescent Social Work Journal*, 17(4), 289–304. Retrieved from <http://ezproxy.umsf.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=aph&AN=3560077&site=ehost-live&scope=site>

- Malti, T., Gummerum, M., Keller, M., Chaparro, M. P., & Buchmann, M. (2012). Early sympathy and social acceptance predict the development of sharing in children. *PLoS ONE*, 7(12), 1–7. doi:10.1371/journal.pone.0052017
- Measelle, J. R., Ablow, J. C., Cowan, P. A., & Cowan, C. P. (1998). Assessing Young Children's Views of Their Academic, Social, and Emotional Lives: An Evaluation of the Self-Perception Scales of the Berkeley Puppet Interview. *Child Development*, 69(6), 1556–1576.
- Qin, D. B. (2008). Doing well vs. feeling well: Understanding family dynamics and the psychological adjustment of Chinese immigrant adolescents. *Journal of Youth and Adolescence*, 37(1), 22–35. doi:10.1007/s10964-007-9220-4
- Qin, D. B., Way, N., & Mukherjee, P. (2008). The Other Side of the Model Minority Story: The Familial and Peer Challenges Faced by Chinese American Adolescents. *Youth & Society*, 39(4), 480–506.
- Smokowski, P. R., Rose, R., & Bacallao, M. L. (2008). Acculturation and latino family processes: How cultural involvement, biculturalism, and acculturation gaps influence family dynamics. *Family Relations*, 57(3), 295–308. doi:10.1111/j.1741-3729.2008.00501.x
- Suinn, R. M., Kathryn, R.-F., Lew, S., & Vigil, P. (1987). The Suinn-Lew Asian Self-Identity Acculturation Scale: An Initial Report. *Education and Psychological Measurement*, (47), 401–407.
- Tardif, C. Y., & Geva, E. (2006). The Link between Acculturation Disparity and Conflict among Chinese Canadian Immigrant Mother-Adolescent Dyads. *Journal of Cross-Cultural Psychology*, 37(2), 191–211. doi:10.1177/0022022105284496
- Telzer, E. H. (2011). Expanding the acculturation gap-distress model: An integrative review of research. *Human Development*, 53(6), 313–340. doi:10.1159/000322476
- Tsai, J. L., Ying, Y.-W., & Lee, P. a. (2000). The Meaning of “Being Chinese” and “Being American”: Variation among Chinese American Young Adults. *Journal of Cross-Cultural Psychology*, 31(3), 302–332. doi:10.1177/0022022100031003002
- Weaver, S. R., & Kim, S. Y. (2008). A person-centered approach to studying the

linkages among parent-child differences in cultural orientation, supportive parenting, and adolescent depressive symptoms in Chinese American families. *Journal of Youth and Adolescence*, 37(1), 36–49. doi:10.1007/s10964-007-9221-3

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