

# OURJournal

Oregon Undergraduate Research

Volume 15, Issue 1, Spring 2019





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## Cover Art—“Corona de Rosas Espinosa”

Isabelle Amezcu\*a, Philosophy, History

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This piece is a stance against Machismo Culture, another name for Toxic Masculinity, that is prevalent in Latin America (as toxic culture is a part of all cultures). As a biracial Latina woman who grew up in the border town of Chula Vista, California, and later Portland, Oregon, I saw a lot of toxic behaviors from both Latino and White men. Simply existing as a female meant that catcalls were very common, whether while walking at night or being out in general. Thus, I had to grow to be hyper-aware of my surroundings. This piece lets me reclaim some of my own space, and the horns and the flower crown are reminders that people can be feminine, strong, and tough. We don't need to be told to smile, we don't need to be soft and approachable, we can be tough, neutral-faced, and spiky. We can wear jewelry, we can wear makeup, and we don't owe strangers our time or conversation.

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\* Isabelle Amezcu, is a Philosophy and History double major at the University of Oregon. Born in Washington D.C., she later moved to California, where she spent the first part of her childhood in Chula Vista, a ten-minute drive from the Mexican border. She attended her first year of school in Tijuana before moving to Portland, where she spent her formative years. Inspired by her grandpa, who is an artist himself, Isabelle spends a lot of her free time painting and drawing. As her grandpa still lives in D.C., they stay in touch by texting each other random doodles and paintings. Her grandpa is the one who started her passion for art, although its therapeutic effects and her own vested interest in it keep her creating whenever she can between school and work. Please direct correspondence to [iaa@uoregon.edu](mailto:iaa@uoregon.edu).



## Letter from the Editor

Joshua J. Pearman\*, Psychology

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Dear readers,

I believe that one of the most significant roles that undergraduate research serves is to amplify the voice of undergraduate students in the critical discourse of knowledge. For myself, this has been a year of many firsts: the first poster presentation, first thesis proposal, and first research collaboration. Even as a student, research equips me to engage in a two-way conversation with the academic literature; a conversation that comes less naturally in a one-way lecture. As I reflected on each of these new experiences, it struck me that they all had one consistent theme: mentorship. I am able to pursue research because of the faculty and graduate students who chose to invest in me. Notably, I have had many fantastic graduate student mentors who have empowered me during my academic career, and know that many other undergraduates have a similar story. Thus, I wish to express my appreciation to the many faculty members and graduate students who play a key role in supporting undergraduate research.

With the completion of this academic year, I want to recognize the tremendous effort that the OURJ editorial board has put into this issue. Each issue is the result of the board's numerous hours of meticulous examination for each manuscript. The OURJ prides ourselves on a thorough review process, which is only possible because of the contribution of each individual editor. This year, we have three editors who will be graduating: Amber Shackleford, Sravya Tadepalli, and Jamie Rehlaender. Each of these editors have played a significant role on OURJ's editorial board, and I wish them the best in all their future endeavors. I also want to personally thank Barbara Jenkins, who has played a key role in how OURJ's evolution as an academic journal. This year also marks the end of my time as Editor-in-Chief, an experience which has been instrumental in developing my understanding of research journals and leadership. I am elated to pass on this position to the next Editor-in-Chief, Starla Chambrose, and am confident she will go on to do great things for the journal.

True to OURJ's tenet of interdisciplinary research, the present issue showcases work from numerous academic disciplines at the University of Oregon, and includes three UO Libraries Undergraduate Research Award winners. This issue highlights research on a 17th century Persian manuscript, questions the use of randomized control trials in new treatments, investigates how originality is associated with memory, examines how the "homophobic Muslim" was sensationalized, and explores the interchange of religion between the east and west. We are also excited to feature a guest editorial written by Professor Josh Snodgrass, Associate Vice Provost for Undergraduate Research and Distinguished Scholarships, who shares his thoughts on the power of undergraduate research.

Finally, we hope you enjoy the 15th issue of the Oregon Undergraduate Research Journal!

\* Joshua is a junior psychology major in the Clark Honors College. He is a research assistant in the Social Affective Neuroscience Lab and Personality and Social Dynamics Lab, and is working on developing research and data analysis skills to pursue graduate study in Industrial-Organizational Psychology. He is interested in the science of teams in organizations, and hopes to both conduct and apply group dynamics research in the future. Outside of academics, Joshua enjoys reading sci-fi novels and watching films with his friends. Please direct correspondence regarding this issue of OURJ to ourj@uoregon.edu.



## Guest Editorial—“The Power of Undergraduate Research”

J. Josh Snodgrass, Professor of Anthropology & Associate Vice Provost for Undergraduate Research and Distinguished Scholarships

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When I first set foot on the campus of the University of California, Santa Cruz as a community college transfer student from a low-income background, I had no idea that research was even a possibility for undergraduates. In fact, I honestly don't think I even knew that research was being conducted on campus at all. But then a serendipitous event changed my life. A new professor at UCSC, Alison Galloway, approached me—one of the top students in her human osteology class—and asked if I would be interested in assisting her with her osteology research and forensic anthropology casework. I jumped at the opportunity. Over the next two years, I worked on dozens of forensic cases from all over northern California—the remains of a homicide victim near Yosemite, an unidentified body from the Monterey Bay, and a storage unit filled with unknown cremains—and collaborated on research with Professor Galloway and the Los Angeles County Coroner.

My undergraduate research experience was truly life-changing. I learned to work as part of a team. I learned to formulate and test hypotheses. I learned public speaking skills and how to present at a conference. And I learned how valuable my skills could be when applied to medicolegal issues. Never before had I been so intellectually stimulated and never before had I felt so valuable, like I had skills that others needed. And I was needed, for my undergraduate forensic experience led me after graduation to human rights work in Bosnia and Croatia, working for Physicians for Human Rights and the United Nations to build a legal case against perpetrators of genocide based on physical evidence from mass grave sites such as Srebrenica and Vukovar. I would not be the same person I am today without those experiences and I am forever grateful to Professor Galloway for opening my eyes to this amazing world.

When I started as a professor at UO in 2005, I was thrilled to be in the position to involve undergraduates in my research, to look for ways to enrich their academic experience and change their lives. Over the last decade and a half, I have mentored dozens of students in my Global Health Biomarker Laboratory and they have done cutting-edge research on topics as varied as inflammatory bowel disease among indigenous Amazonians, rural-urban differences in sleep among older adults, and risk factors for cardiovascular disease among native Siberians. Although I knew that these experiences would be transformative for my students, what I did not anticipate was how much this work with students would enrich my life. I am energized by their passion, heartened by their commitment, in awe of their talents. And now, from my position as Associate Vice Provost for Undergraduate Research and Distinguished Scholarships, I have

expanded this work to coordinate undergraduate research opportunities across campus. Every day I learn about new and exciting research that our students are doing, some of which you will learn about in the pages of this issue of OURJ.



## Meet the Editorial Board

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### STARLA CHAMBROSE

Starla is a sophomore in the Clark Honors College majoring in biology and history. She is interested in attending graduate school to study how the human genome can shed light on a variety of historical and demographic questions. She holds a black belt in Taekwondo and has completed the Oregon Music Teachers Association Piano Syllabus program "With Distinction." In her free time, Starla enjoys going to sporting events, travelling, and watching Disney movies with friends.

### KAYLA DAVIS

Kayla is a junior in the Clark Honors College majoring in CDS (communication disorders and sciences) and minoring in special education. She works as a research assistant in the Optimizing Swallowing and Eating for the Elderly lab and plans to research the impact of post-stroke swallowing disorders on caregiver burden for her CHC thesis. Outside of school, Kayla works as a personal support worker and enjoys knitting, playing piano, reading, and playing tennis in her free time.

### EMMA DORINSON

Emma is a junior in the Clark Honors College majoring in math and minoring in Spanish and economics. In terms of research, Emma is interested in studying math education in the secondary level and plans to pursue this topic for her CHC thesis. Besides her editorial position for the journal, Emma works in the library as a writing tutor. Emma's other interests include music, art history, films and traveling.

### DAVID GRABICKI

David is a junior history and PPPM (planning, public policy, and management) major in the Clark Honors College. He has served as a research assistant for the Sustainable Cities Initiative working on a book project on designing streets for bikes and cyclists. His research interests lay at the crossroads between history and policy/planning. He is currently focusing on documenting a history of Oregon planning. His career goals vary by the day, but they center around transportation planning and further academic work. Outside of class or work, he can be found riding his bike around Eugene, reading, and bothering his friends.

## **SRAVYA TADEPALLI**

Sravya is a senior in the Clark Honors College studying political science and journalism with a minor in Middle East and North Africa Studies. Her research interests are primarily in U.S. foreign policy, particularly in the areas of democracy promotion and human rights. She hopes to pursue a career in foreign policy or serve in public office in the future. Outside the journal, Sravya serves as the president of the UO Foreign Policy Forum, reports on politics for KWVA Radio, and coaches debate for the Corvallis School District.

## **SHUXI WU**

Shuxi is a sophomore majoring in anthropology, Asian studies, economics and international studies. She pursues research in globalization, transnational mobility and political economy and plans to go to graduate school in anthropology in the future. She works as a coordinator for the UO Associated Students of Undergraduate Research and Engagement and serves on the board of the UO Undergraduate Anthropology Club.



# Sa'di and the Safavid: The Material Culture of a Treasured Persian Manuscript Now at UO

Elmira Louie\*, Comparative Literature, English

## ABSTRACT

The Burgess MS 43 manuscript of Sa'di's *Bustan* and *Gulistan*, now at the University of Oregon Special Collections Archive, was created in 1615 CE in Persia. It was later transported to Europe, where the original Persian leather binding was swapped for a more European style: soft, red velvet with two silver clasps. John Ruskin, the preeminent art theorist of Victorian England, once held this manuscript in his own private collection. Ruskin's view of a Persian manuscript eloquently depicts the richly decorated first page, "wrought with wreathed azure and gold, and soft green and violet, and ruby and scarlet, into one field of pure resplendence. It is wrought to delight the eyes only; and it does delight them." The intricate illuminated ornaments open a window to the Safavid dynasty. In this paper, I will reconstruct the manuscript's original historical and cultural context, returning us to seventeenth-century Shiraz.

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In 1615 CE, the Burgess MS 43 manuscript of Sa'di's *Bustan* and *Gulistan* was created in Persia. At some point in its life, the manuscript was transported to Europe, where the original Persian leather binding was swapped for a more European style: soft, red velvet with two silver clasps. According to a book seller's catalogue entry, this manuscript once belonged to John Ruskin, the preeminent art theorist of Victorian England. His view of a Persian manuscript eloquently depicts the richly decorated first page, "wrought with wreathed azure and gold, and soft green, and violet, and ruby and scarlet, into one field of pure resplendence. It is wrought to delight the eyes only; and it does delight them."<sup>1</sup> Gold, red, and blue colors border the text in a frame and illuminate the pages with varying floral and leaf patterns. Microscopy of a similar Persian manuscript suggests that vermillion may have been used as red ink and in the floral decorations, while red lead was employed as a principal hue or tempered with vermillion.<sup>2</sup> The brilliant blue pigment most likely comes from ultramarine, a highly expensive material, yet common for important, well-done illuminated manuscripts. The generous use of gold on every page further adds to the expense and high value of this manuscript, both in its time and beyond.

While this intricate design is typical for Persian works of art, and can even be found in the patterns of modern Persian carpets, this paper reconstructs the original historical and cultural context of this manuscript based on the design of the first page. The Burgess Sa'di

\* Elmira graduated in June 2019 from the University of Oregon and the Robert D. Clark Honors College. She majored in Comparative Literature and English, and minored in Spanish. Her love of travel has taken her all over the world, although she grew up in Eugene. She will be moving to California this September 2019 in order to begin her PhD in Comparative Literature at the University of California, Davis. Her areas of interest include translation studies, feminist theory, and Persian, Spanish, and Turkish poetry. Please direct correspondence to [elouie@uoregon.edu](mailto:elouie@uoregon.edu).

traveled throughout Persia and Europe, and now has made its way to the University of Oregon Special Collections Archive, adopting a whole new set of contexts and associations. Yet, it can serve as a lens into Persia and, given its known date of creation, leads us back to the Safavid period.

The Safavid dynasty (1501-1736) cultivated a culture of the arts, including calligraphy, painting, literature, and decorations, during their more than two-century rule of Persia. This high esteem for the arts stemmed from the fact that “virtually every member of [the royal] family (both male and female) was accomplished as a calligrapher and poet and active in the patronage and collecting of art.”<sup>3</sup> While the royal court commissioned “the great masterpieces of Iranian painting,”<sup>4</sup> they themselves practiced the arts as well. For instance, Sultan Ibrahim Mirza (1540-1577), prince of the Safavid family and later the governor of one of the key cities, Mashhad, composed verses, bound books, and decorated pages with gold and varying colors. His artistic endeavors were encouraged by his uncle, Shah Tahmasp, the second Safavid ruler. Shah Tahmasp was not only an avid patron of the arts, but also established the imperial workshops called “*kitabkhana* (literally, ‘book house,’ but actually signifying both artistic studio and library) where numerous calligraphers, painters, illuminators, binders, and other specialists created deluxe volumes of classical Persian texts.”<sup>5</sup>

Each decadent text coming out of the *kitabkhana* was a miniature treasure, not only decorated in highly valuable and expensive material like gold and ultramarine, but also produced by the best calligraphers, painters, and illuminators in all of Persia. *Kitabkhana* were established in all of the large cities and provincial centers, including Tabriz, Isfahan, Shiraz, and Mashhad, and the works created were almost always either directly for the Shah (king) or other members of the royal court. Each town, however, had multiple bazaar workshops for themselves, where local artists, most often apprentices, practiced their skills and created manuscripts for the general public, rather than for the elites.<sup>6</sup> Manuscripts that came out of the bazaar workshops are of lower quality, both in terms of materials and artistic skill. They also have fewer decorations and ornaments, whereas each page of *kitabkhana* manuscripts brim with geometric designs and often included miniature paintings.<sup>7</sup>

The Burgess Sa’di manuscript’s high quality material and design – with its generous use of gold, vibrant colors on every page, uniform and symmetric calligraphy, and strong, durable paper – is most likely not a product of modest bazaar workshops. However, its lack of full-page miniature paintings within the text suggests that though it was created in a *kitabkhana*, it was perhaps meant for a member of the outer royal court rather than, say, the Shah himself. Indeed, “if the Shah was Iran’s leading patron, he was not the only one. While employed at court, royal artists augmented their incomes by illustrating humbler manuscripts for government officials or rich merchants,”<sup>8</sup> and so it is perhaps to the favor of such officials or merchants that our Burgess Sa’di came to be.

For sixteenth and seventeenth-century Persian artists, “the peak of worldly success was recognition at the Shah’s court and membership in the royal workshop, a virtual magnet to which exceptional artistic talent was drawn.”<sup>9</sup> Without the formal job application process that we have today, aspiring artists had to rely on natural talent, a network of connections, and just a bit of luck. The typical acceptance procedure into a *kitabkhana* might look something like this: “If an apprentice painter in Shiraz revealed extraordinary ability, he was likely to be hired away from the bazaar workshop by the local governor, who would before long offer him to the Shah in hopes of currying favor.”<sup>10</sup> Accordingly, *kitabkhana* and placement into one relied on a network of class structures, social positions, cultural tradeoffs, and a system of favors. The Safavid court’s love of literature and arts thus inspired generations of artists and successfully wove a new system of workshops into the fabric of Persian culture from the sixteenth century onwards.

At the *kitabkhana*, artists produced the greatest masterpieces of Persian literature, had access to the best and most expensive materials, and received training in how to improve their skill and hone it to the specific Safavid artistic taste. Safavid period painters who worked at or trained at the court *kitabkhana* expressed a principle stylistic characteristic that can be found in almost all manuscripts of this tradition, which includes “large-scale composition that frequently overflow into the surrounding margins; a bright and extensive palette of jewel-like (and often precious) pigments polished to a high sheen; fluid, rhythmic lines...and intricate ornamental patterns.”<sup>11</sup> Ornaments were often used to decorate the page margins and served an essential role of establishing page structures and controlling the surfaces.

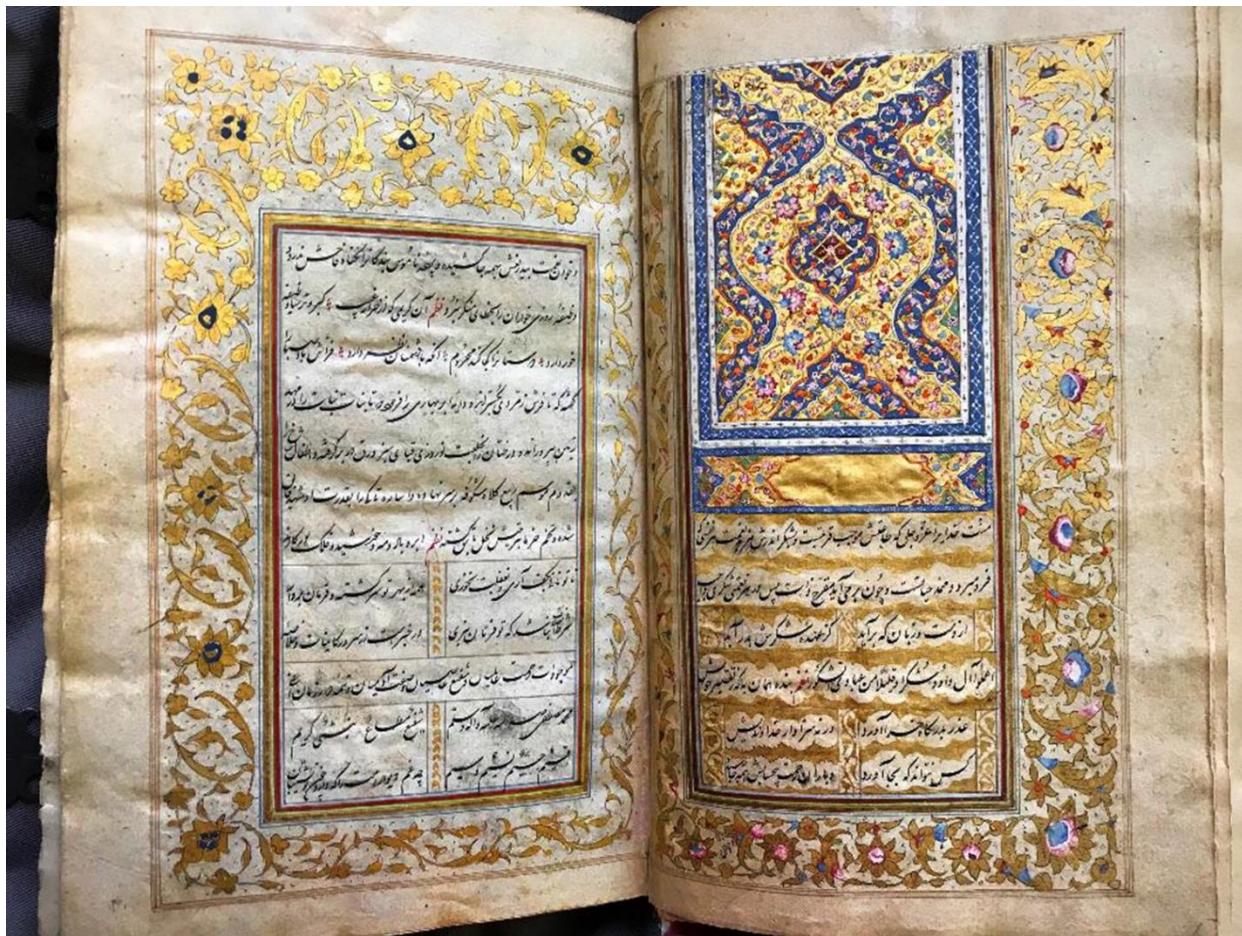
The specific ornament present throughout the Burgess Sa’di, particularly prominent in the carpet-like design on the first page, was referred to in the West as *arabesque*: “at the time of the Renaissance, entering the vocabulary of a wide range of art forms.”<sup>12</sup> However, due to its Orientalist origins and several misleading definitions,<sup>13</sup> the more accurate and Persian term for the design on the Burgess Sa’di manuscript is *islimi*. While the Persian word *islimi* “means both ‘Islamic’ and ‘arabesque,’” *islimi* shouldn’t be identified solely with Islamic design because “the definition of *islimi-khata’i* (used as a doublet) is the lines traced around paintings.”<sup>14</sup> This “rhythmic design based upon flowering vines,”<sup>15</sup> has now become integrally associated with all Iranian compositions and art work, as seen in architecture, furniture, and paintings. As scholar and curator Stuart Cary Welch observes, without *islimi*, “these paintings would be as unthinkable as an orchestra playing a Bach suite without rhythm. With it, they are the visual equivalent of poetic verse.”<sup>16</sup> The *islimi* in our Burgess Sa’di thereby compliments the written words themselves, the flowers and leaves symbolically nodding to the literal meanings of *Bustan* (“garden”) and *Gulistan* (“place with flowers”), as well as bordering the calligraphy of prose and poetry with a visual, aesthetically pleasing poetry of its own.

Although the Safavid court established an artistic style used all over Persia, major cities developed their own particular styles in addition to the broader Safavid style. One such city was Shiraz, depicted as “a city of enduring artistic vitality,” which “had held its

position as the centre of commercial manuscript production throughout the sixteenth century.”<sup>17</sup> Shirazi artistic style stressed two-dimensional and decorative values, rather than space and volume, and typically

Throughout the codex, the written surfaces and the illustrations are enframed with colored and gold lines or rulings...their headings written within a central gold cartouche, which is rounded with either slightly scalloped or distinctly projected ends. The inscribed cartouches are always flanked by two smaller units filled with diverse geometric designs in contrasting colors...the illuminated forms [of] scallops, medallions, lappets, zigzags [all] defy easy description. All are typical of Shiraz illumination.<sup>18</sup>

The Burgess Sa’di has elements of this Shirazi design, as evident with its border of scalloped units, primarily in gold and blue, varying geometric design, and *islimi* blossoms. Though the designs point towards our manuscript being made in Shiraz, the strongest indication comes from the calligraphy. Our manuscript is written in *Nasta’liq*, the elegant cursive script “common for Shirazi scribes and now believed to have originated in Shiraz.”<sup>19</sup> Thus, the painting, decorations, and calligraphy combined strongly suggest the Burgess Sa’di was created by a team of artists, illuminators, and scribes in a Shiraz *kitabkhana* for a member of the wealthy elite.



**Figure 1.** The decorated first page of The Burgess MS 43 manuscript of Sa'di's *Gulistan and Bustan*.

Source: Louie, Elmira. *Burgess MS 43 Gulistan and Bustan*. 2019. The Burgess Manuscript Collection, University of Oregon, Eugene.

## ACKNOWLEDGMENTS

I wish to express my deepest appreciation to my mentor, Professor Vera Keller. Without her class, guidance, and expertise, this project would not have existed. I would also like to thank everyone at UO Libraries, particularly those in Special Collections who granted me access to the Sa'di manuscript while I was conducting my research.

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<sup>1</sup> "A Sixteenth-Century Persian Illuminated Manuscript of the 'Shāhnāma' of Firdausī," Bodleian Library, Oxford, Ashmolean, n.d., [ruskin.ashmolean.org/object/OXFBL.Dep.b.5](http://ruskin.ashmolean.org/object/OXFBL.Dep.b.5).

<sup>2</sup> Dan A. Ciomartan and Robin J.H. Clark, "Raman Microscopy Applied to the Analysis of the Pigments Used in Two Persian Manuscripts" 7, no. 6 (1996): 395–402.

<sup>3</sup> Marianna Shreve Simpson, *Persian Poetry, Painting & Patronage: Illustrations in a Sixteenth-Century Masterpiece* (Washington D.C: Freer Gallery of Art, 1998), 12.

<sup>4</sup> Oleg Grabar, *Mostly Miniatures: An Introduction to Persian Painting* (Princeton University Press, 2000), 66.

<sup>5</sup> Simpson, *Persian Poetry, Painting & Patronage*, 12.

<sup>6</sup> Stuart Cary Welch, *Persian Painting: Five Royal Safavid Manuscripts of the Sixteenth Century* (New York: George Braziller, 1976), 12.

<sup>7</sup> Grabar, *Mostly Miniatures*, 23.

<sup>8</sup> Welch, *Persian Painting*, 14.

<sup>9</sup> Welch, *Persian Painting*, 12.

<sup>10</sup> Welch, *Persian Painting*, 12.

<sup>11</sup> Simpson, *Persian Poetry, Painting & Patronage*, 14.

<sup>12</sup> Marty Roth, "Gilman's Arabesque Wallpaper," *Mosaic: An Interdisciplinary Critical Journal* 34, no. 4 (2001): 147.

<sup>13</sup> Mohammad Khazâie, "The Source and Religious Symbolism of the Arabesque in Medieval Islamic Art of Persia," *Central Asiatic Journal* 49, no. 1 (2005): 1.

<sup>14</sup> Yves Porter, "From the 'Theory of the Two Qalams' to the 'Seven Principles of Painting': Theory, Terminology, and Practice in Persian Classical Painting," *Muqarnas* 17 (2000): 113–14, <https://doi.org/10.2307/1523293>.

<sup>15</sup> Welch, *Persian Painting*, 13.

<sup>16</sup> Welch, *Persian Painting*, 13.

<sup>17</sup> Sheila R. Canby, *Persian Painting* (New York: Thames and Hudson, 1993), 86.

<sup>18</sup> Marianna Shreve Simpson, *Princeton's Great Persian Book of Kings: The Peck Shahnama* (Princeton University Art Museum, 2015), 25, 70.

<sup>19</sup> Simpson, *Princeton's Great Persian Book of Kings*, 23.



# The Ethics of Developing New Treatments: A Case Study of the West African Ebola Outbreak and the Use of Randomized Control Trials

Nelly Noubossi\*, Biology

## ABSTRACT

The 2014-2015 Ebola epidemic was the most devastating Ebola outbreak in history, killing over 10,000 people. During the outbreak, the WHO led efforts to design the best method to test the potential treatments quickly. Randomized controlled trials (RCTs) were proposed as the best method, although many experts opposed their use, deeming them inappropriate in the context of an epidemic. Despite the long debate, RCTs were used to test the available treatments. This paper presents arguments both supporting and opposing RCTs, and analyzes a few example RCTs conducted to answer the following question: “were RCTs effective at helping researchers fight the epidemic?” This paper argues that RCTs were not the best approach for two reasons: the principle of equipoise requires that patients are provided available treatments; if RCTs were to be used, they should have begun earlier to ensure the validity of the findings.

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## INTRODUCTION:

Ebola virus disease (EVD) is a severe and often fatal illness in humans. EVD first appeared in 1976 when two outbreaks occurred simultaneously in present-day South Sudan and Democratic Republic of Congo (“Ebola virus disease,” 2018). There have been five identified strains of the Ebola virus, but three of them (*Zaire, Sudan, Bundibugyo*) are responsible for the majority of cases in humans (Coltart, Lindsey, Ghinai, Johnson, & Heymann, 2017). The Ebola virus is introduced into human populations through contact with the blood, secretions, and bodily fluids of infected animals such as fruit bats and chimpanzees (“Ebola virus disease,” 2018). From there, it spreads between humans through the same mechanism . On March 23, 2014, the WHO's regional office in Guinea reported an outbreak of EVD (“Ebola virus disease,” 2018). This outbreak spread to nearby counties and primarily affected three West African countries: Guinea, Sierra Leone and Liberia. Nigeria was also infected.. It was the most devastating Ebola outbreak

\* Nelly Nouboussi is a third-year biology major, with minors in Chemistry and Global health. Originally from Cameroon, central Africa, she moved to the United States when she was 13 to continue her education. She plans to graduate from college and attend medical school to become a neurosurgeon. She volunteers at the Riverbend Hospital, is the co-director of the African Student Association and conducts research in a research lab at the Institute of Neuroscience on campus, which led to her being able to present her research at the University's annual undergraduate symposium. She has participated in a global health-related internship in Accra, Ghana during which she learned more about the healthcare system in the country. She is also a pathway mentor for 1st-year students and a biology tutor. Her hobbies include running, watching TV and performing African dance. Her long-term goals include returning to Cameroon to contribute to the development of a better healthcare system. Please direct correspondence to [nnoubous@uoregon.edu](mailto:nnoubous@uoregon.edu).

in history as 28,646 cases and 11,223 deaths were reported, with the mortality rate in some regions as high as 70% (Coltart et al., 2017).

During the outbreak, efforts led by the WHO focused on designing the best method to gather data about available treatments quickly. Drugs such as Zmapp and vaccines such as ChAd3 demonstrated effectiveness against Ebola in primates, but they had not yet been tested in humans. The gold standard for clinical trials—double-blind Randomized Controlled Trials (RCTs)—was proposed, but there were ethical questions regarding its appropriateness in the context of an epidemic. The first part of this paper will outline the key arguments given by proponents and opponents of RCTs and will also discuss some proposed alternative study designs. The second part of the paper will analyze five of the RCTs conducted to assess their safety and efficacy. While there were significant arguments for and against RCTs, I argue they were not the best approach during the Ebola outbreak because the ethical principle of equipoise *required* distributing the treatments to all patients in this situation, not just those in the “treatment” group of a RCT. If they were to be conducted, RCTs should have started earlier to ensure a large enough sample size for the data to be valid and useful.

## ARGUMENTS FOR RANDOMIZED CONTROLLED TRIALS

Multiple arguments were proposed to justify the need to conduct RCTs, the main one being that they ensure the validity of data. In principle, RCTs balance out all the confounding variables and ensure comparability between treatment and control groups (Upshur & Fuller 2016). The goal is to decrease the likelihood of any observed effect being the result of variables other than the treatment. Lanini et al. (2015) focus on the placebo control group to justify the use of RCTs. The authors argue that having a placebo control allows for clear contrast between the two groups, making even minor differences detectable.. In other words, since the only difference expected between the two groups is the experimental drug, even small differences would be attributed to the drug. Otherwise, the lack of a placebo control group would create uncertainty as to whether the effect is due to the experimental treatment or some other factor. Furthermore, the authors argue that being able to generate reliable data quickly using RCTs is important because researchers will be armed for future outbreaks . Because uncertainty might result from using experimental treatments in non-randomized studies, researchers will not be sure that these drugs will be effective again in the future. Therefore, RCTs should be conducted to test experimental treatments because they provide the most valid results and thus prepare the global community for subsequent outbreaks.

Another reason why researchers believe RCTs should be conducted is that they ensure the safety of the patients. The main ethical principle behind this argument is equipoise, which means that there is genuine uncertainty among clinical experts over the risks or benefits of an untested clinical treatment (Adebamowo et al., 2014). In other words, if healthcare workers are truly uncertain about the potential risks associated with the treatment, randomization is the safest avenue. Clifford Lane, deputy director for clinical research and special projects at the US National Institute of Allergy and Infectious Diseases put it best: "the idea that there is no need for controlled trials presupposes that the drugs have zero side effects, that they are efficacious, and

that there's no substantial variability from patient to patients [...] I don't think any of that is true" (Hayden, 2014). Moreover, Philippe Calain, a researcher for MSF (Doctors Without Borders), states that the efficacy of a treatment on animals is not always a good predictor of its effect on humans (Calain, 2016). He says this in response to the proposition that one of the experimental vaccines shown to be effective in chimpanzees be distributed to all Ebola patients without conducting RCTs ("Ethical Considerations for Use of Unregistered Interventions for Ebola Virus Disease (EVD)," 2014). This proposition was made during a panel discussion organized by the WHO in August 2014. Hence, the potential that the drug might show adverse effects to humans as opposed to non-human primates explains the need to conduct RCTs first.

Additional arguments in favor of RCTs focus on the scarcity of resources in affected countries. The first argument is that limited funding and resources demand that treatments be used to generate reliable data quickly—any other use would be wasteful. According to Lanini et al. (2015), even a small quantity of treatments can be used in RCTs to generate significant data about their effectiveness; using them in non-randomized trial would reduce their potential and be wasteful . The authors argue that since not everyone can be helped, it makes the most sense to use the few treatments available to acquire knowledge which will be more impactful for the present and future. In "Evaluating Ebola Therapies - The case for RCTs," the authors take it one step further by arguing that since the treatments are limited in quantity, RCTs are not actually depriving anyone from the drugs and should instead be used to generate reliable data (Cox, Borio, & Temple, 2014). The authors argue that the patients in these West African countries would not have had access to the treatment anyways, and thus they are not being put in more danger by participating in an RCT or being excluded from one.

Additionally, the limited resources demand that patients be altruistic and accept that the burdens and benefits of research will not be distributed equally. Lanini et al. (2015) ask the difficult questions very clearly: "How do you distribute treatments that are not produced on a mass-scale in non-randomized studies? Who gets it and who doesn't?". The authors make the point that even if we wanted to distribute the treatments widely, it is not feasible. This is mainly because of the high cost of treatments and the lack of health infrastructure in affected countries. Philippe Calain (2016) attempts to provide an answer by arguing that patients should choose to enroll in these trials for the greater good . In other words, patients should accept the risk of being placed in a placebo group and forget about their self-interests. There is no need to answer the question above, as patients would choose to give up the potential benefits they may obtain from an experimental drug for the greater good.

Calain's argument assumes that all patients are altruistic and, even in an epidemic, will act in the best interest of society. His argument also outlines the main goal of Randomized Controlled Trials (RCTs): to generate robust data that contribute to the advancement of knowledge and ultimately benefit future patients (Calain, 2016). The inherent goal of RCTs is not to benefit individual patients, but to benefit society as a whole, and more specifically future generations. This also suggests that the controversy over the use of RCTs stems from the misunderstanding of the goal of these trials by those who oppose their use. Therefore, scarcity of resources is used as

the primary reason to explain that the priority should be to generate data quickly through RCTs, and that patients should choose to enroll in these trials for the sake of the greater good.

## ARGUMENTS AGAINST RANDOMIZED CONTROLLED TRIALS

Multiple arguments have also been put forward to explain why RCTs are not ethical. RCTs, as argued by some health care workers, cause mistrust between patients and their healthcare system. The article "Randomized controlled trials: practical and ethical issues," was written by authors from various countries, including those affected by the Ebola outbreak (Guinea, Nigeria, Liberia). In this article, the authors discuss issues that healthcare workers in these countries face. They state that because patients are already terrified due to the epidemic and already lack trust in healthcare workers, they will be even more distrustful if they know that potential treatments are withheld for the purpose of research (Adebamowo et al. 2014). The authors believe that the patients would not understand the rationale behind them receiving the "standard of care" (nothing or a placebo) when other options are available. Additionally, doctors' therapeutic obligation to treat their patients conflicts directly with randomization (Calain, 2016). If doctors have to enroll their patients into RCTs and some are placed in the placebo group, the doctor-patient relationship will be compromised because patients cannot be sure that doctors are acting in their best interest. Thus, the preservation of patients' trust and doctors' obligation to treat justifies the need to avoid RCTs.

The context of a disease epidemic is also given as a reason for why RCTs are inappropriate, since they are neither ethically acceptable nor feasible. According to Adebamowo et al. (2014), the concept of equipoise, which was discussed earlier as justification for RCTs, breaks down "when conventional care offers little benefit and mortality is extremely high." The Ebola outbreak was rapidly claiming people's lives, with mortality rates as high as 70% in some regions (Adebamowo et al. 2014). In other words, because conventional care was ineffective, any experimental treatment would most likely yield more benefits than harm and should therefore be used. Jeremy Farrar, head of the Wellcome Trust and an infectious disease researcher, argues that RCTs are just as problematic for sick healthcare workers when he asks: "if you were there tomorrow and you were a healthcare worker, would you be willing to be in a control arm when the next three months you will be looking after patients with Ebola?" (Cohen & Kupferschmidt, 2014). This implies that local healthcare workers would be just as likely to take the risk. Hence, RCTs are not ethically acceptable to both patients and workers because high mortality rates minimize the risk of taking an experimental treatment.

Additionally, RCTs are not feasible in the context of an epidemic. First of all, when patients are terrified due to an Ebola outbreak, they cannot offer truly voluntary informed consent (Adebamowo et al. 2014). This means that patients would be too distracted by their deteriorating health and the conditions around them to make an informed decision regarding the trials. Moreover, it might not be possible to control conditions during an epidemic because the trials would be conducted in areas where healthcare systems are breaking down and fear has been instilled in the communities (Adebamowo et al., 2014; Hayden, 2014; Kanapathipillai et al., 2014). This argument is significant since one of the reasons why RCTs are considered superior is because

they balance confounding variables and ensure that the only difference between the two groups is the experimental treatments. However, if the trials are conducted in settings where healthcare systems are broken and people are scared, anxious and distrustful of health facilities, it may not be possible to control for all the factors that could affect the results.

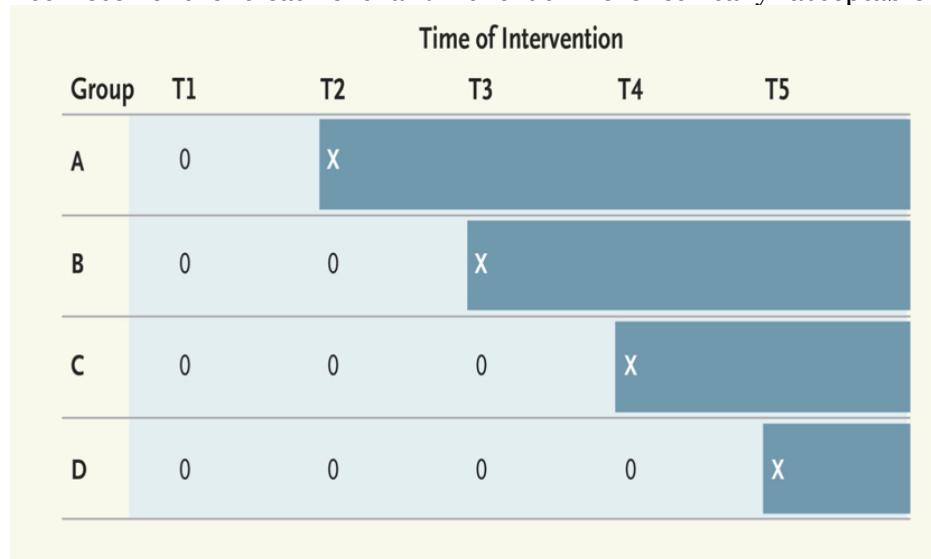
The final argument against RCTs directly attacks the claim that they produce more reliable and valid data. In their article "Randomized Controlled Trials in the West African Ebola virus outbreak," Ross Upshur and Jonathan Fuller (2016) argue that it is impossible to balance out all the confounding variables. They state that "all studies fall short of the guarantee of pristine group comparability and that this ideal is not required". They believe that the absence of selection bias is necessary when a study is only looking for a small outcome, whereas investigators who are designing Ebola treatments want to see large treatment effects. They argue that if a drug is effective, it should have a drastic effect on patients' survival rate, which would be noticeable even in non-randomized studies, rendering RCTs unnecessary. This is in contrast to Lanini et al. (2015) article which argues that RCTs are necessary because they will enable researchers to detect small effects. The difference in opinion comes from whether researchers are looking for small or large outcomes; Upshur and Fuller would argue that large outcomes are needed when the mortality rate is so high. They end their article by stating that there is no gold standard, as the best design depends on the purpose and context, which is also a point made in other articles (Adebamowo et al. 2014; Hayden 2014; Upshur and Fuller 2016).

## ALTERNATIVE DESIGNS

Most of the articles that argue against RCTs propose alternative approaches, two of which will be discussed. The most emphasized design was the adaptive RCT. In this type of study, the trial is modified as data is generated (Calain, 2016; Lanini et al., 2015). For example, if a large number of people die in the control group compared to the experimental group during the first few weeks of the trial, the trial would be modified so that more people in the control group would receive the drug. In other words, the likelihood that the trial will end depends on the mortality rate in the control group (Adebamowo et al. 2014). This would minimize the number of people in the control group who do not receive the treatment. The reasoning behind this design is that if a treatment is extraordinarily effective, it would be evident early on and the trial would end early so that everyone can receive the new treatment (Lanini et al. 2015). Alternatively, if the drug is not very effective, the difference between the two groups will probably not be significant, and the trial would continue as planned. An adaptive design preserves the scientific superiority of RCTs while ensuring that most people receive the treatment on time.

Another alternative is the stepped wedge design, which ensures that all people receive vaccines, but at different time periods. In this design, as shown in figure 1, participants are randomly assigned to different groups which receive the vaccine at one of several time periods (Kanapathipillai et al. 2014). Outcomes in each group are measured at each point where the next group receives the vaccine (Kanapathipillai et al. 2014). This allows researchers to gather data sequentially and to compare the results of groups at different time points. According to virologist Barney Graham, such a design would be more ethically acceptable to patients because everyone

eventually receives the treatment (Cohen & Kupferschmidt, 2014). Therefore, similar to the adaptive design, such a technique would decrease the likelihood that a large number of people do not receive the treatment and is thus more ethically acceptable than traditional RCTs.



**Figure 1.** Stepped-wedge study design (Kanapathipillai et al. 2014)

## WAS THE APPROACH EFFECTIVE?

Despite all the proposed arguments against RCTs, multiple RCTs were conducted in West Africa and abroad for the candidate drugs and vaccines that were available in 2014-2015. Three of these treatments will be discussed: the triple monoclonal antibody cocktail Zmapp, the chimpanzee adenovirus type-3 vector-based Ebola Zaire vaccine (ChAd3) and the recombinant vesicular stomatitis virus vaccine (rVSV). Five randomized studies conducted between 2014 and 2015 will be analyzed to argue that RCTs were not the best method to effectively address the 2014-2015 epidemic because the principle of equipoise requires distributing the drugs to all patients, not just those enrolled in the treatment arm. Alternatively, if they were to be conducted, RCTs should have been started earlier to ensure a large enough sample size for the data to be valid and useful.

The first reason why RCTs were not the best approach is that these studies all showed that the experimental treatments were safe, immunogenic and/or partially effective. A study conducted between September and November 2014 tested the safety and immunogenicity of ChAd3 on 60 adult volunteers in Oxford, United Kingdom (Ewer et al., 2016). The participants received one injection of the vaccine at three different doses. The investigators did not identify any safety concerns and determined that the vaccine was immunogenic (may help the body mount an immune response against the Ebola virus) at the three different doses (Ewer et al., 2016). Another study conducted between October 2014 and February 2015 tested the safety and immunogenicity of ChAd3 on 91 participants in Mali and 20 in the US (Tapia et al., 2016). The participants received either different doses of the vaccine or a placebo. Again, the vaccine was safe and the investigators determined the dose of the vaccine that could be used in ring-vaccinations to provide "high-level

protection" (Tapia et al., 2016). Another study conducted between October 2014 and June 2015 tested the safety and immunogenicity of ChAd3 on 120 participants in Switzerland (De Santis et al., 2016). They also concluded that the vaccine was safe, although there were mild to moderate adverse effects, including fatigue and headache. The vaccine was shown to be immunogenic even after 6 months and the investigators recommended its use in phase 2 and 3 trials.

Another study conducted between February and April 2015 tested the safety and immunogenicity of ChAd3 and rVSV on 1500 participants in Liberia (Kennedy et al., 2017). One month after treatment, the vaccine had elicited an immune response which was sustained over 12 months and no safety concerns were identified (Kennedy et al., 2017). Finally, another study was conducted beginning March 2015 to determine the effectiveness of ZMapp in a total 72 patients in Liberia, Sierra Leone, Guinea, and the United States. Patients received either ZMapp and the standard of care or the standard of care alone. In the control group, 37% of people died compared to 22% in the experimental group, which meant that Zmapp was 91.2% superior to the standard of care alone, although it did not meet the 97.5% threshold to qualify as effective (The PREVAIL II Writing Group, 2016). All five studies had one thing in common: they showed that the treatments were safe and potentially effective. The principle of equipoise requires balancing the risks and benefits of experimental treatments compared to conventional care (Adebamowo et al. 2014). As mentioned earlier, the mortality rate was as high as 70% in some regions following conventional care measures. Hence, the high mortality rate with conventional care illustrates that this epidemic was time-sensitive, as it was rapidly killing patients. The results of the study suggest that because of the need to act quickly, the risk was worth taking as the experimental treatments were unlikely to be riskier than the conventional care. The principle of equipoise would therefore dictate that the drugs be made available to all patients. One can thus argue that they should have been distributed in non-randomized studies to potentially reduce the number of deaths.

Another reason why RCTs were not the best approach is the fact that they were so controversial and led to long debates which delayed intervention. While the epidemic was declared in March 2014, the first RCT began in September 2014 as a result of the debate over the best design to use (Ewer et al., 2016). This delay weakened the trial because there were few available patients for enrollment after it formally started. Two studies addressed this issue. The RCT conducted in Liberia was initially planned to be both phase 3 (which would involve Ebola patients to determine the efficacy of the experimental therapies) and phase 2 trials (to determine safety, by using healthy subjects) (Kennedy et al., 2017). However, because of the decline in new Ebola cases, investigators were unable to enroll enough Ebola patients, and could only enroll healthy patients and assess safety and immunogenicity in a phase 2 trial (Kennedy et al., 2017). The study was conducted in 2015, and investigators were unable to test the vaccines on enough patients to determine its effectiveness. Similarly, the ZMapp study described above also needed to start the experiments early since it had been proven to be effective in non-human primates in the 5-day window after infection (The PREVAIL II Writing Group, 2016). In reality, it was difficult to find and recruit patients in the midst of the epidemic, and the patients ultimately enrolled were more than one week past their date of infection.

For those people enrolled in the ZMapp trial, those who died in the experimental group died before receiving their second of three programmed ZMapp injections (The PREVAIL II Writing Group, 2016). Patients already had the disease for quite some time before enrolling in the trial, which implies that the trial did not test the full potential of this drug. The fact that they did not even receive two of the programmed injections and ZMapp was still 91.5% superior to the standard of care shows that it could be more effective. Finally, the authors attribute their small sample size to the decline in cases (The PREVAIL II Writing Group, 2016). A larger sample size may have highlighted the effectiveness of ZMapp to a greater extent. This again shows that the delay in starting the intervention were due to the debates regarding the most appropriate study design, leading to a small sample size for the trials and thus an ineffective assessment of the treatments. While this may suggest that RCTs would have been beneficial if they had started early, it actually highlights why they were problematic: the controversy that arose over their use delayed intervention, which was detrimental because the ability of researchers to generate valid data regarding the treatments required an earlier start.

Finally, RCTs were not the best approach to address the epidemic because the typical process of conducting drug trials ensured that patients would not have acquired the treatments in a timely manner. Even if the trials had started on time, it might have still taken too long before the treatments were offered to patients. This is first due to the need to conduct safety trials. Four of the studies described earlier were safety and immunogenicity trials. Because Phase 1 trials are required before conducting phase 2 or phase 3 trials, this would have further delayed the date of treatment. Additionally, scientific data must be repeatable. The safety trials for the ChAd3 vaccine were conducted in the US, the UK, Switzerland and Mali, and they all confirmed that the vaccine was safe, which was necessary to make sure that the data is reliable. Even if the trials had started earlier, conducting all these safety trials in different locations would have also delayed the intervention. It would have been more efficient to conduct the safety trials in the areas affected first, and move on to efficacy trials. Finally, the trials themselves lasted between 2 and 12 months. This is relatively long considering that Ebola patients were dying rapidly. Because it would have taken so long to generate significant data, the principle of equipoise again requires that the treatments be made widely available. The principle of equipoise insists that as long as there is uncertainty over the risks and benefits of the experimental treatments, safety trials must be conducted and valid data must be generated through randomization. However, because of the need to act quickly and the high mortality rates, the time it would have taken to generate data in order to help patients provides additional evidence for the argument that RCTs were not the best approach.

## **CONCLUSION:**

As this paper has shown, there were valid arguments on both sides of the debate for the appropriateness of RCTs during the 2014-2015 Ebola epidemic. On one hand, proponents of RCTs focused on the need to generate robust data, the safety of patients, and the benefit to society as a whole. On the other hand, opponents of RCTs focused on high mortality rate, the need to preserve patient-doctor trust, and the benefit to individual patients. One interesting dilemma that arose

from these arguments is whether the priority of researchers lies in observing small improvements or more obvious ones through the use of experimental treatments. Some proponents of RCTs argued that this type of experimental design detects small differences between the two groups, but opponents argued that RCTs are not necessary because as long as the drug is significantly effective, removing all the confounding variables is not required.

A close look at five RCTs conducted during and after the outbreak led to the conclusion that RCTs were not the best approach because the principle of equipoise required that treatments be made available to patients. Alternatively, RCTs should have been started earlier to ensure a high enough sample size for the data to be valid. All of the studies found that the experimental treatments were safe and immunogenic. Thus, the treatments should have been distributed to patients because the studies showed that the patients would not have been in greater risk than with conventional care. Additionally, the delay in interventions, due to the debates over the appropriateness of RCTs, made it more difficult for researchers to gather data because cases began to decline. Finally, the actual process of conducting clinical trials was another roadblock because it ensured that the patients would not be provided with the treatments on time. Ultimately, the findings from these and subsequent RCTs add to the knowledge on treatments for EVD and will be beneficial to future patients. The next epidemic will be less challenging because there will be some knowledge on the safety and potential efficacy of these treatments, which means that healthcare workers will be better armed. This fact is not surprising because, as mentioned above, the goal of RCTs is not to help individual patients but to generate knowledge that will be beneficial to society as a whole, and especially future generations.

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# The Role of Originality in Retrieval from Long-Term Memory: Relations Between Fluency, Originality, Working Memory Capacity, and Crystallized Intelligence

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## ABSTRACT

To better understand the cognitive processes necessary for successful verbal fluency (a measure of retrieval from long-term memory) performance and why individuals differ in performance, the present study ( $n = 148$ ) examined relations between fluency, originality, corrected fluency, working memory capacity, and crystallized intelligence. Results demonstrated that fluency significantly and positively correlated with originality; however, many of the relations between fluency, originality, corrected fluency, working memory capacity, and crystallized intelligence varied across the different category fluency tasks (animals and supermarket items). Additionally, an examination of the output position (order) of recalled items indicated that original items tended to be emitted towards the end of the recall period. Recalling common items prior to unique items may serve as a strategy by which participants begin their search through long-term memory by focusing on the most easily accessible items before emitting less accessible items. Indeed, individuals who increasingly recalled common items before unique items tended to recall more items overall, but this finding also varied across the fluency tasks. Collectively, the results suggest that originality, working memory capacity, crystallized intelligence, and output position are all factors that should be taken into consideration when accounting for variation in verbal fluency performance.

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## 1. INTRODUCTION

Verbal fluency, the number of items a participant can generate from long-term memory (LTM) for a given category, can be an excellent measure of retrieval ability. When accessing items from LTM, many factors affect the search process, including strategy use, working memory, and task-related knowledge. For example, search strategies such as clustering items and switching between clusters have been shown to increase performance in fluency tasks (Gruenewald & Lockhead, 1980; Troyer, Moscovitch, & Winocur, 1997). Individuals may also differ in working memory

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capacity (WMC) as well as levels of knowledge, and these differences can affect retrieval performance (Hughes & Bryan, 2002; Rosen & Engle, 1997). That is, those with high WMC and increased task-related knowledge demonstrate better verbal fluency. The uniqueness of recalled responses can be an additional predictor of performance (e.g., Dumas & Dunbar, 2014; Silvia, 2008) and may also be related to the factors of how individuals differ in their retrieval from LTM.

### **1.1 FLUENCY**

Research has indicated that in semantic verbal fluency tasks, participants use a two-stage cyclical process to guide their search of LTM (Gruenewald & Lockhead, 1980). For instance, in an animal fluency task, participants typically begin by searching for general categories, or clusters, of animals (e.g., pets), then begin searching for items within these clusters (e.g., cat, dog, hamster, etc.) until they have exhausted the items in said clusters. They repeat this process until all clusters have been exhausted (Gruenewald & Lockhead, 1980). Building off of this model, Troyer, Moscovitch, and Winocur (1997) referred to clustering as the generation of items within categories and referred to switching as the generation of new categories. They found both factors to be important determinants of performance. They also discovered age-related differences in overall performance and credited older adults' poorer performance to a deficit in switching but found no age differences in clustering. Unsworth, Spillers, and Brewer (2011) found a similar effect in healthy young adults. They suggested that although both clustering and switching are related to fluency, switching was more highly related to performance, indicating that the ability to self-generate category cues may be more important than the number of items emitted in each category.

### **1.2 WORKING MEMORY CAPACITY**

Working memory, short-term memory responsible for temporarily holding information available for processing, has been found to be a predictor of high order cognitive abilities and performance in a wide variety of real-world cognitive tasks such as reasoning (Kyllonen & Christal, 1990), writing (Benton, Kraft, Glover, & Plake, 1984), reading comprehension (Daneman & Carpenter, 1980), and complex learning (Kyllonen & Stephens, 1990). When discussing working memory "capacity," researchers are referring to individual differences in storage capacity and the ability to focus attention. In terms of fluency, measures of WMC have been shown to relate to fluency scores (e.g., Rosen & Engle, 1997; Unsworth et al., 2011). Specifically, high WMC individuals typically recall more items and more clusters of items while also recalling items at a faster rate (Unsworth, Brewer, & Spillers, 2013). These differences may be due to high WMC individuals being more efficient at searching their memory than low WMC individuals, partly because high WMC individuals are better able to select and utilize appropriate search strategies to guide retrieval via self-generation of category cues and individual items within said categories (Unsworth et al., 2011).

### **1.3 CRYSTALLIZED INTELLIGENCE (gC)**

Vocabulary tests have long been used as measures of crystallized intelligence (gC), the ability to use one's learned knowledge (Cattell, 1943). Differences in vocabulary knowledge have been

found to account for fluency scores in that better fluency performance is associated with better vocabulary (e.g., Hughes & Bryan, 2002; Troyer et al., 1997; Unsworth et al., 2011). Individuals with better vocabulary may use this knowledge to enhance performance via associative links between items so that more words are generated before each category is exhausted. In terms of strategy use, research suggests that vocabulary is associated with clustering but not switching (Unsworth et al., 2011). This indicates that the associative links between words can increase output within clusters but do not assist in generating cues for new categories. Clearly, verbal fluency performance is driven both by WMC via strategic search and vocabulary via associative links between words.

#### 1.4 ORIGINALITY

While fluency scores account for the grand total number of items that a participant generates for a given task, these scores do not account for the uniqueness of the items. Originality is the relative uniqueness of the generated exemplars. In regards to fluency, researchers have found fluency and originality to be significantly and positively related (e.g., Dumas & Dunbar, 2014; Silvia, 2008). Thus, those who recall more items overall tend to be more unique in their responses. There is some disagreement regarding the strength and direction of the relationship between fluency and originality (e.g., Hocevar, 1979); however, a significant positive relationship is typically found (e.g., Dumas & Dunbar, 2014), and these differences likely arise due to the method used to score originality.

Originality has been operationalized in many ways, such as using a panel of raters (e.g., Hocevar, 1979), participant self-report (e.g., Silvia, 2011), statistical infrequency, (e.g., Silvia, 2008), and semantic analysis (e.g., Dumas & Dunbar, 2014). Each of these methods has unique strengths and weaknesses. For example, originality scores generated by a panel of raters tend to be subjective; scores for the same word can vary significantly even when raters are highly trained (e.g., Sternberg, 2006). In self-report methods, participants may have good insight into their own minds and can therefore judge their originality. However, they are not highly trained and therefore lack an advanced understanding of the operationalization of originality, biasing this method of measurement.

As opposed to subjective measures, more objective measures (such as semantic analysis or statistical infrequency) can be more effective. In semantic analysis, the originality of ideas is scored through the use of semantic networks. Specifically, the greater the semantic distance of an exemplar from a cue, the higher the originality score it will receive. While semantically derived originality scores are not sample-dependent, semantic analysis is best suited for divergent thinking tasks (e.g., Dumas & Dunbar, 2014). When scoring originality via statistical infrequency, if a participant is the only individual in the entire sample to generate a particular item, this item would score highly for originality while more common items would receive lower scores. Although free of subjectivity, this method is highly sample dependent. The same exemplar generated by different participants in different samples could receive vastly different originality scores. Additionally, some researchers have found this method to confound originality scores with fluency scores (e.g., Hocevar, 1979). That is, one might argue that as the size of the response set

increases, so does the likelihood of the set containing original items. To improve discriminant validity, corrected fluency scores calculate the total number of items recalled minus the number of original items recalled. These adjusted fluency scores help control for correlations due to heightened total output and help fluency and originality to be measured as separate constructs. Given the various strengths and weaknesses of these methods, the statistical infrequency method was used to measure originality in this study.

The goal of the current study was to gain a better understanding of the dynamics of retrieval and the relationship between fluency, originality, WMC, and gC. To examine these issues, we administered several tasks where participants performed a number of fluency, WMC, and gC measures. As suggested by prior research (e.g., Unsworth et al., 2011), we expect to replicate the finding that fluency scores correlate with WMC and gC. Using statistical infrequency as an index of originality, we should be able to track the uniqueness of participants' responses as well as the recall order of items. Specifically, the cognitive correlates of originality will be examined in order to better elucidate the processes that are needed for successful performance and why individuals differ in their performance. We suggest that originality, WMC, and gC all positively predict verbal fluency performance. We also expected fluency and originality to positively correlate and for this relationship to increase as the metric of originality is expanded. Additionally, limited research suggests a positive association between originality and gC (Silvia, 2008), but we expected to find no such relationship with WMC, as evidence suggests WMC affects the quantity of responses but not the items. Lastly, we expect original items to have a later average output position than common items. We suspect that participants will first recall common, easily accessible items and eventually transition to recalling unique, less accessible items once easily accessible items are exhausted from LTM.

## 2. METHOD

### 2.1 PARTICIPANTS

Participants were 148 undergraduate students recruited from the University of Oregon Human Subjects Pool. Participants were between the ages of 18 and 35 years and received course credit for their participation. Participants were tested individually in a laboratory session lasting approximately 2 hours.

### 2.2 MATERIALS

#### SEMANTIC FLUENCY

Participants completed two fluency tasks with different categories. In the first task, participants were instructed to retrieve as many exemplars from the category "animals" as possible in 5 minutes. The participants were informed that they could retrieve the items in any order that they wished; they were required to type in each item and then press Enter to record the response. Participants were instructed that they needed to keep trying to retrieve items throughout the entire 5-minute period. In the second task, the instructions were identical except

the category was “supermarket items.” The animal and supermarket tasks were selected because they have been shown to be related to other fluency measures (e.g., Unsworth et al., 2011). In fluency tasks, participants typically emit items rather quickly in the beginning, but their rate of responses slows considerably as time passes (Crowe, 1998). As a result, many researchers have used fluency tasks with varying lengths (e.g., 1 minute: Unsworth et al., 2011; 5 minutes: Unsworth et al., 2013; 15 minutes: Rosen & Engle, 1997). However, in the 1 minute version of this task, it is possible that participants do not have enough time to fully exhaust their clusters or the items within each cluster. In this study, participants were given 5 minutes to recall items as the extra 4 minutes should have given them plenty of time to exhaust each category and maximize their output.

When scoring responses for fluency in the animal task, any attempt to emit a type of living being, real or fake, was counted as correct. In the supermarket task, any item that could be located and purchased inside a typical supermarket was considered correct. Errors were categorized as repetition (emitting the same item more than once), semantic repetition (e.g., lion and lioness, soda and pop), not an exemplar (e.g., mammals, carbohydrates), and does not exist (submissions that were not animals or items found in a typical supermarket). Within the data coding process, participants’ incorrect responses due to spelling errors or typos were corrected within reasonable doubt (e.g., the response “sal” followed by the response “pepper” was interpreted as “salt”). Additionally, different responses of the same exemplar were corrected to the official name of the exemplar and coded as a repetition error (e.g., “arctic fox” and “arctic snow fox” were both counted as “arctic fox” since they are semantically identical). Participants received separate fluency scores for the animal and supermarket tasks in addition to a cumulative fluency score amounting from both tasks. Task-specific fluency scores were calculated by summing the total number of correct responses for each task, while cumulative fluency scores were calculated by summing each task-specific fluency score.

### ORIGINALITY

Originality scores were calculated by scoring participants based on their number of unique responses. Based on the recommendations of Milgram and Milgram (1976), for most analyses in this study, original items were considered as those that were emitted by less than 5% of the sample (the number of items per participant that were emitted 7 times or less out of the 148 included participants). Similar to fluency scores, participants received separate originality scores for each task in addition to a cumulative originality score.

### CORRECTED FLUENCY

Corrected fluency scores were calculated by subtracting the participants’ originality score from their fluency score. For example, if a participant had a fluency score of 50 and an originality score of 10, their corrected fluency score would be 40.

## OUTPUT POSITION

In the fluency tasks, each response was tracked via output position. The difference between the mean output position for common and original items was calculated for each participant to assess at what point during the tasks original items were typically emitted. For example, if a participant's mean output position for common items was 20 and the mean output position for original items was 30, that individual's output position mean difference would be -10 (indicating that the participant recalled unique items towards the end of the task). Incorrect responses were not included in mean output position calculations. Additionally, participants with no original items in their response set were excluded from output position analysis.

## WORKING MEMORY CAPACITY

*Operation span.* Participants solved a series of math operations while trying to remember a set of unrelated letters that were presented for 1 second each. Immediately after a letter was presented, the next operation was presented. Three trials of each list length (3-7) were presented, with the order of list lengths varying randomly. At recall, letters from the current set were recalled in the correct order by clicking on the appropriate letters. For all of the span measures, the score was the proportion of correct items in the correct position. The operation span task has been shown to have both good internal consistency and test-retest reliability (Unsworth, Redick, Heitz, Broadway, & Engle, 2009; see Unsworth, Heitz, Schrock, & Engle, 2005, for more task details).

*Symmetry span.* Participants were required to recall sequences of red squares within a matrix while performing a symmetry judgment task. In the symmetry judgment task, participants were shown an  $8 \times 8$  matrix with some squares filled in black. Participants decided whether the design was symmetrical about its vertical axis. The pattern was symmetrical half of the time. Immediately after determining whether the pattern was symmetrical, participants were presented with a  $4 \times 4$  matrix with one of the cells filled in red for 650 milliseconds. At recall, participants recalled the sequence of red-square locations in the preceding displays in the order that they had appeared by clicking on the cells of an empty matrix. There were three trials of each list length, with list length ranging from 2 to 5 (Unsworth et al., 2009).

*Reading span.* Participants were required to read sentences while trying to remember the same set of unrelated letters as in the operation span. For this task, participants read a sentence and determined whether or not the sentence made sense. Half of the sentences made sense, and the other half did not. Nonsense sentences were made by changing one word from an otherwise normal sentence (e.g., "During the final week of spaghetti, I felt like I was losing my mind."). After participants had indicated whether the sentence made sense or not, they were presented with a letter for 1 second. At recall, the letters from the current set were recalled in the correct order by clicking on the appropriate letters. There were three trials of each list length, with list length ranging from 3 to 7 (Unsworth et al., 2009).

For a composite WMC score, scores for the three complex span tasks were z-transformed for each participant. These z scores were then averaged together.

## VOCABULARY

*Synonym vocabulary.* Participants were given 10 vocabulary words and were required to select the best synonym (out of five possible choices) that best matched the target vocabulary word (Hambrick, Salthouse, & Meinz, 1999). Participants were given 2 minutes to complete the 10 items. A participant's score was the total number of items solved correctly.

*Antonym vocabulary.* Participants were given 10 vocabulary words and were required to select the best antonym (out of five possible choices) that best matched the target vocabulary word (Hambrick et al., 1999). Participants were given 2 minutes to complete the 10 items. A participant's score was the total number of items solved correctly.

A participant's composite vocabulary (gC) score was the total number of items solved correctly. Scores were calculated by summing the scores from the two tasks.

## **2.3 PROCEDURE**

After obtaining informed consent, participants completed operation span, symmetry span, reading span, animal fluency, supermarket fluency, synonym vocabulary, and antonym vocabulary tasks. As is typically done in individual differences studies of this type, all participants performed the tasks in the same fixed order in order to avoid the confounding of individuals with a particular task order that would complicate individual differences analyses due to an increase in error variance (Salthouse & Babcock, 1991). At the completion of the study, participants were thanked for participation, debriefed about the goals of the study, and provided contact information in case of further questions.

## **3. RESULTS**

A total of 34 participants were excluded from analysis for having incomplete data, obvious lack of effort, or failure to follow task instructions (leaving 148 individuals for analysis). Descriptive statistics for all measures can be seen in Table 1 and the correlations between animal fluency, supermarket fluency, cumulative fluency, task-specific originality, cumulative originality, task-specific corrected fluency, cumulative corrected fluency, WMC, gC, and task-specific output position mean difference are shown in Table 2.

An examination of the results suggests a number of findings. First, fluency in the animal task correlated with fluency in the supermarket task ( $r = .561, p < .001$ ). Also, originality in the animal task correlated with originality in the supermarket task ( $r = .513, p < .001$ ). This demonstrates the validity of both measures and suggests that these measures of fluency may be domain-general and not limited to animals or supermarket items, but many other categories of information. As mentioned previously, originality was operationalized as items recalled by less than 5% of participants (by 7 people or fewer, out of the 148 included participants). At this level, cumulative originality significantly correlated with cumulative fluency ( $r = .687, p < .001$ ) in addition to task-specific fluency (animal task:  $r = .685, p < .001$ ; supermarket task:  $r = .667, p < .001$ ). This

demonstrates that the uniqueness of responses relates to the total number of responses and that this relationship holds true across domains.

**Table 1.** Descriptive statistics for all measures.

	Mean	Median	Std. Deviation	Minimum	Maximum
zWMC	.07	.15	.73	-2.20	1.16
Composite Vocabulary	7.54	7.00	3.46	1.00	18.00
Cumulative Fluency	104.80	105.00	20.40	53.00	170.00
Animal Fluency	44.43	45.00	10.78	20.00	75.00
Supermarket Fluency	60.34	60.00	12.30	33.00	95.00
Cumulative Corrected Fluency	84.33	84.50	14.95	38.00	117.00
Animal Corrected Fluency	38.29	39.00	8.23	19.00	58.00
Supermarket Corrected Fluency	46.04	46.50	9.18	19.00	66.00
Cumulative Originality	20.45	17.50	12.03	2.00	75.00
Animal Originality	6.14	5.00	4.94	0.00	30.00
Supermarket Originality	14.30	13.00	8.73	1.00	46.00
Animal Errors	1.71	1.00	2.47	0.00	23.00
Supermarket Errors	1.76	1.00	2.45	0.00	13.00
Total Errors	3.47	3.00	3.64	0.00	26.00
Animal Repetition Errors	1.07	1.00	2.11	0.00	22.00
Supermarket Repetition Errors	.59	0.00	.84	0.00	4.00
Cumulative Repetition Errors	1.66	1.00	2.36	0.00	23.00
Animal Semantic Errors	.64	0.00	1.22	0.00	6.00
Supermarket Semantic Errors	1.17	0.00	2.17	0.00	13.00
Cumulative Semantic Errors	1.81	1.00	2.63	0.00	14.00
Animal Common Average Output Position	22.55	22.76	5.29	10.21	36.51
Animal Original Average Output Position	30.29	30.08	8.86	11.00	51.87
Animal Output Position Mean Difference	-6.82	-7.37	7.53	-22.22	16.27
Animal Average Output Position of Errors	26.91	26.50	13.70	1.50	60.00
Animal Average Output Position of Correct Items	26.61	24.31	5.69	13.00	42.65
Supermarket Common Average Output Position	29.79	29.09	6.17	13.79	46.67
Supermarket Original Average Output Position	38.02	37.63	9.04	18.38	58.42
Supermarket Output Position Mean Difference	-8.23	-8.46	7.77	-26.00	13.06
Supermarket Average Output Position of Errors	35.35	35.30	16.20	2.00	76.14
Supermarket Average Output Position of Correct Items	32.50	31.86	6.53	17.06	49.75

Originality and its relation to fluency was evaluated across multiple levels of originality (items mentioned once, twice, three times, etc. in the entire sample). Cumulative fluency and cumulative originality strongly positively correlated, and the correlation coefficient increased as the level of originality increased (all  $p$ 's < .001). As previously discussed, corrected fluency scores were calculated by subtracting individuals' originality scores from their fluency scores. When accounting for corrected fluency, a significant correlation with originality was still found in the animal task ( $r = .297$ ,  $p < .001$ ) but not in the supermarket task ( $r = -.057$ ,  $p = .491$ ) or cumulatively ( $r = .133$ ,  $p = .106$ ). This may be due to the nature of the tasks, as in the supermarket task almost a quarter (23.86%) of the total responses in the sample were considered unique as opposed to just 14.04% in the animal task. Due to the vast number of unique responses, fluency and originality in the supermarket task may lack discriminant validity.

**Table 2.** Correlations for fluency, originality, WMC, vocabulary knowledge, and output position mean difference.

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13
1) Cumulative Fluency	—												
2) Cumulative Originality		.687***	—										
3) Cumulative Corrected Fluency			.811***	.133	—								
4) Animal Fluency				.866***	.548***	.741***	—						
5) Animal Originality					.620***	.782***	.216**	.685***	—				
6) Animal Corrected Fluency						.763***	.249**	.841***	.899***	.297***	—		
7) Supermarket Fluency							.899***	.660***	.696***	.561***	.428***	.478***	—
8) Supermarket Originality								.597***	.936***	.061	.368***	.513***	.175*
9) Supermarket Corrected Fluency									.474***	.706***	-.057	—	
10) zWMC										.225**	.200*	.210*	.068
11) Composite Vocabulary											-.026	.232**	—
12) Animal Output Position Mean Difference												-.251**	-.013
13) Supermarket Output Position Mean Difference												.025	—

Note: \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$

Next, fluency and gC, as measured by vocabulary, are likely related due to certain individuals having a larger knowledge base to draw from. As mentioned above, participants typically retrieve items in clusters, and cluster size is determined in part by the knowledge that individuals bring to each task. The more prior knowledge an individual has in a given domain, the larger the cluster should be. For example, in two individuals who are the same in every category except for their gC levels, the higher gC individual would likely perform better in fluency, as they have greater access to exemplars in their LTM. Consistent with this theory, gC correlated with cumulative fluency ( $r = .168$ ,  $p = .041$ ) and animal fluency ( $r = .318$ ,  $p < .001$ ), but not supermarket fluency ( $r = .000$ ,  $p = .998$ ). This could be the result of the supermarket task involving more episodic memory retrieval and the animal task involving more semantic memory retrieval. For example, when searching for and selecting categories of supermarket items, participants may not rely on their semantic knowledge, but instead imagine themselves in certain aisles or recall a recent receipt at the grocery checkout. On the contrary, most individuals do not have many episodic memories for numerous different kinds of animals. Thus, participants likely use mostly semantic knowledge in the animal task while relying on additional episodic retrieval cues in the supermarket task.

While individual differences in knowledge of animals and supermarket items should be minimal, high WMC individuals typically score higher for fluency because they are able to generate more clusters of items and more items within each cluster, while the low WMC individuals are less able to access these items. Consistent with prior work (Rosen & Engle, 1997; Unsworth et al., 2011; Unsworth et al., 2013), WMC significantly and positively related to

cumulative fluency ( $r = .247, p = .003$ ), animal fluency ( $r = .239, p = .003$ ), and supermarket fluency ( $r = .200, p = .015$ ).

Based on the relationship between fluency and WMC, one might theorize an additional retrieval difference between high and low WMC individuals. In addition to the common items that most participants correctly retrieve, high WMC individuals may also be able to retrieve the less commonly known and unique exemplars that low WMC individuals are unable to access from their LTM, contributing to their increased fluency performance. Consistent with this theory, WMC correlated with cumulative originality ( $r = .213, p = .010$ ) and supermarket originality ( $r = .210, p = .010$ ), but not animal originality ( $r = .146, p = .076$ ). Although the data somewhat supports this theory, we believe that the vast size of the supermarket response set and a lack of discriminant validity is responsible for the correlation between WMC and originality in the supermarket task. The response set, based on the total number of different items recalled, for the supermarket task (1,356) is much larger than that of the animal task (559). Similarly, the number of items considered original in the supermarket task (1,091) is much greater than that of the animal task (371). Since so many of the items in the supermarket response set were considered unique, originality and fluency may be measuring similar constructs. Consistent with this idea, the correlation between supermarket fluency and WMC ( $r = .200, p = .015$ ) is almost identical to the correlation between supermarket originality and WMC ( $r = .210, p = .010$ ). In contrast, in the animal task there are fewer total unique items compared to the size of the response set; hence originality scores in the animal task may still be a valid measure of uniqueness. However, the correlation between WMC and originality in the animal task was non-significant, suggesting there may be no relationship between the two constructs. One of the reasons for the relationship between fluency and WMC is that individuals differ in the number of clusters and items within each cluster generated; however, what the items are and whether or not they are unique does not seem to relate to WMC.

Next, gC and originality correlated in the animal task ( $r = .333, p < .001$ ) but not in the supermarket task ( $r = .027, p = .745$ ) or in cumulative originality ( $r = .156, p = .058$ ). Higher levels of general knowledge are typically needed to emit unique items, thus explaining the strong correlation in the animal task. Again, this relationship difference between the tasks is likely due to the nature of the tasks. The supermarket task may require more episodic memory than the animal task, resulting in less relevance for knowledge in performance as discussed above.

Given the relationships of WMC, vocabulary, and originality with fluency, these three variables were entered into a multiple regression predicting fluency. Shown in Tables 3, 4, and 5, the resulting regression analyses suggest that originality accounted for unique variance in the total number of items retrieved in both tasks as well as cumulatively. However, WMC and vocabulary no longer accounted for significant variance in cumulative fluency once cumulative originality was taken into account. Additionally, unlike the supermarket task, originality, as well as WMC in the animal task, accounted for unique variance in the total number of items retrieved. Once again, this difference in findings between tasks is likely due to the varying size of the response set and the number of items considered unique in each task.

**Table 3.** Linear regression predicting cumulative fluency scores.

Variable	B	t	R^2	F
WMC	.097	1.543		
Composite Vocabulary	.043	.688		
Cumulative Originality	.660	10.715***	.485	45.15***

Table 4

*Linear regression predicting animal fluency scores*

Variable	B	t	R^2	F
WMC	.128	2.087*		
Composite Vocabulary	.076	1.178		
Animal Originality	.641	10.155***	.487	45.50***

Table 5

*Linear regression predicting supermarket fluency scores*

Variable	B	t	R^2	F
WMC	.071	1.036		
Composite Vocabulary	-.034	-.539		
Supermarket Originality	.653	10.320***	.449	39.19***

Note: \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$

Finally, common and original items differed in terms of when they were emitted during the recall period. Each participant was scored for the mean output position of common and original items as well as the difference between the two. A paired samples *t*-test indicated that the mean output position of common items (22.55 in the animal task; 29.79 in the supermarket task) was significantly lower than the mean output position of unique items (30.29 in the animal task; 38.02 in the supermarket task) in both tasks (animal task:  $t(137) = -12.40$ ,  $p < .001$ ,  $d = -1.055$ ; supermarket task:  $t(147) = -12.90$ ,  $p < .001$ ,  $d = -1.060$ ). Thus, participants typically recalled their original responses at the end of the recall period. Additionally, animal output position mean difference was associated with fluency performance ( $r = -.259$ ,  $p = .002$ ), but supermarket output position mean difference was not ( $r = -.121$ ,  $p = .143$ ). Again, this difference across task paradigms may be attributed to differences in response set size across tasks and suggests that in both tasks, participants began retrieval with common items before recalling unique items, and in the animal task, this difference was associated with the recall of more items.

## 4. DISCUSSION

Overall, the results supported our hypotheses and replicated previous findings, further demonstrating that numerous factors impact participants' verbal fluency performance. Research has already indicated the importance of clustering and switching (Gruenewald & Lockhead, 1980; Troyer et al., 1997; Unsworth et al., 2011), WMC (Rosen & Engle, 1997; Unsworth et al., 2013), knowledge (Hughes & Bryan, 2002; Troyer et al., 1997; Unsworth et al., 2011), and originality (Dumas & Dunbar, 2014; Silvia, 2008). However, little research has examined the underlying factors of originality and its role in successful retrieval from LTM.

Originality was positively related to WMC in the supermarket task but not in the animal task, and this difference may be due to a lack of discriminant validity. As demonstrated by previous research, WMC is typically associated with a greater volume of responses, but this does not predict the uniqueness of said responses, only the quantity. Therefore, we think it is likely that the observed positive relation between WMC and originality in the supermarket task may be attributed to Type I error. Research using a wider variety of fluency tasks is needed to better address this possibility. On the contrary, vocabulary knowledge strongly predicted originality scores in the animal task but not in the supermarket task. This finding is likely due to higher levels of general knowledge being needed to emit unique items, but again, we believe the difference in findings may be due to the nature of the tasks, as the supermarket task may involve more episodic memory retrieval than the animal task. Further research using additional fluency tasks is needed to determine the relationship between WMC, gC, and originality.

While using the count method as an index of originality may create a discriminant validity problem with fluency, one significant retrieval difference emerged. Average output position in both tasks was found to be significantly different for original versus common items, as original items tended to be recalled towards the end of the tasks. Additionally, output position mean difference was associated with fluency performance in that participants that began retrieval with common items before recalling unique items tended to recall more items overall. However, this finding was only present in the animal task, likely due to the differences in the size of the response set as discussed above. Nevertheless, this suggests two additional aspects of the retrieval process from LTM.

First, participants likely begin retrieval with the easiest, most accessible items in LTM such as dog, cat, apples, or oranges, before recalling less-accessible items such as blue-tongued skink or Whatchamacallit candy bars. While clustering and switching were not evaluated in this study, we believe the output position tended to be later for original items because individuals start with more accessible, common items in each cluster, eventually exhausting each cluster as the task continues. High fluency individuals then begin recalling additional unique items, contributing to their higher total. Since these individuals are generating more items in each cluster, the likelihood of emitting unique items increases, thus resulting in the discriminant validity problem. Corrected fluency correlations partially support this theory, as the strength of the relationship with originality decreased in both tasks. However, more research with a wider variety of tasks is needed to determine if this finding is domain-general.

Second, as discussed above, the typical search strategy of participants is to select clusters of items and then recall items within said clusters. However, since participants recalled more total items in the supermarket task ( $M = 60.34$ ,  $SD = 12.30$ ) than in the animal task ( $M = 44.43$ ,  $SD = 10.78$ ), participants likely exhausted each category faster in the animal task. In their remaining time, participants may resort to recalling miscellaneous and unique items sooner than they would in the supermarket task, resulting in higher originality scores. A follow-up study to evaluate this theory could examine recall order as well as clustering and switching to determine if unique items are recalled towards the end of each cluster or grouped together at the end of the retrieval period in fluency tasks.

While these findings are interesting, there are a few limitations in the study. For example, the count method for scoring originality may lack discriminant validity depending on the specific fluency task. In this study, fluency and originality were only evaluated in two categorical fluency tasks. A follow-up study could evaluate fluency and originality in many more tasks such as letter fluency (e.g., words that start with the letter s) and more category fluency tasks such as recalling types of fruit or different occupations (e.g., Crowe, 1998) in addition to the animal and supermarket tasks. This would allow for greater domain-general assessment and may provide insight into some of the differences found between the supermarket and animal tasks. Additionally, using a team of raters to operationalize originality alongside the count method could further demonstrate the validity of the measure.

In terms of intelligence, this study only evaluated crystallized intelligence. Another type of intelligence, fluid intelligence, is the ability to think abstractly, identify patterns and relationships, and solve problems using logic (Cattell, 1943). Future research could investigate the relationship between fluid intelligence and fluency, originality, and WMC.

Some might argue that varying levels of category-specific knowledge for animals or supermarket items may confound the results. While someone with advanced knowledge may be able to continuously emit exemplars over the entire 5 minutes and post high fluency and originality scores, a similar study by Rosen and Engle (1997) accounted for time in their analysis, and their findings were similar even when only evaluating the first minute of the task. This, in addition to the large sample size ( $n = 148$ ), suggests that participants with advanced category-specific knowledge would still show similar trends and not confound the data.

A possible alternative explanation for some of this study's findings could be that high and low WMC individuals differ in mental processing speed. This suggests that given enough time, low WMC individuals would have similar fluency and originality scores as high WMC individuals. Although not evaluated in this study, we do not believe processing speed is responsible for the results. Past studies have given participants 15 minutes for the animal task and even with triple the time, high WMC individuals still outperformed low WMC individuals in fluency (e.g., Rosen & Engle, 1997).

Additionally, levels of motivation may vary between high and low WMC individuals. For example, low WMC individuals may be less motivated to perform well, leading to lower scores on WMC, gC, and fluency tasks. Again, although not measured in this study, we do not believe that the level of effort accounted for the results. Prior studies have demonstrated that differences in WMC are unlikely to be found due to differences in motivation or effort. Heitz, Schrock, Payne, and Engle (2008) evaluated participants on the reading span task and gave participants monetary rewards based on their performance. Results demonstrated that the monetary rewards increased performance equally in high and low WMC individuals, meaning high WMC individuals still outperformed low WMC individuals. If participants had overall differences in motivation, differences in all tasks would be expected. Although motivation and effort clearly impact performance, these variables typically do not affect WMC.

Lastly, this study's findings may be limited in that the directions given to participants for each fluency task were vague. As is typically done in fluency tasks (e.g., Unsworth et al., 2013), participants were simply told to come up with as many items as possible. The task did not instruct participants to be creative or original; thus, participants may not have been trying to be creative or original in their responses. A future study could conduct a task with similar conditions but instruct the participants to try to be unique and original.

In sum, while more research is needed to fully understand the constructs, the present study replicates previous findings, and the results suggest that fluency and originality, scored via statistical infrequency, are best conceptualized as distinct but positively related constructs. The order of recalled common and unique items may be an additional strategic difference in that participants typically begin their search with easily accessible items before emitting less accessible items.

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# The Sensationalization of the "Homophobic Muslim": Tracing the Roots of Islamophobia and Homophobia

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## ABSTRACT

Within the white supremacist imaginary has emerged a highly sensationalized figure: the "homophobic Muslim." Islam's proximity to Blackness fosters the Islamophobic ascription of criminality and bigotry to Muslims. Homophobia and heterosexism, however, in addition to the notions of gender and sexuality themselves, are white supremacist constructs, dating back to the Middle Passage. Thus, the "homophobic Muslim" narrative operates as a branch of white supremacy, positioning the racialized migrant subject as both illegitimate and threatening, as well as camouflaging the innate anti-Blackness of homophobia altogether. Through examination of the works of numerous preeminent Black feminists and other LGBT academics of color, this paper delves into the anti-Black origins of Islamophobia and the Islamophobic nature of the dissemination of the "homophobic Muslim" in popular discourse, as well as the coloniality of gender, sexuality, and homophobia. Labeling Muslims as the source of homophobia and bigotry more generally also functions to justify structural violence against the "homophobic Muslim" at the same time that it claims that such a figure is a threat to the neoliberal democracy. Findings include the examination of Iran's sociopolitics and the relationships between contemporary LGBT folks and their Muslim families. Further research is necessary to establish a clear relationship both between the "homophobic Muslim" fiction and real, material violence committed against Muslim individuals, and between the imposition of Western heteropatriarchal systems around the world and the persistence of bigoted attitudes towards homosexuality in imperialized regions, while white spaces increasingly claim to be moving in "progressive," liberal directions.

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## I. INTRODUCTION:

Widespread in the West is the sensationalization of the "homophobic Muslim," as well as a moral panic pertaining to such a figure. As Western nation-states increasingly proclaim that they are moving in more "progressive" directions, white communities often cast misogyny and homophobia under an Orientalist light (Snorton and Haritaworn 71). Situating Eastern populations as uncivilized and inferior to those in the West leads to the attribution of bigotry and violence against gender/sexual minorities to Islam. Beneath this misconception, of course, lies an

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Islamophobic undercurrent, which itself acts as part of a greater project of white supremacy (Smith 2). Furthermore, anti-Blackness serves as the fulcrum of white supremacy and is fundamental to the understanding of Islamophobia, which in turn functions to persecute and delegitimize migrants, whose Islamic faith is thought to be antithetical to whiteness (Beydoun). Painting Islam as the face of homophobia falsely incriminates the racialized Muslim migrant and disregards the colonial roots of homophobia and heterosexism, as well as the prevalence of Islamophobia in the West. Gender and heterosexism being colonialist and anti-Black notions themselves, the "homophobic Muslim" acts as one of the many facets of the white supremacist imaginary, positioning the racialized migrant subject as both illegitimate and threatening and evading the inherent whiteness and anti-Blackness of homophobia altogether. Through examination of the anti-Black roots of Islamophobia, the ascription of criminality to both Black and Muslim communities, quintessential examples of the propagation of the "homophobic Muslim" in popular discourse, the coloniality of homophobia, and a contemporary case study of homophobia within an Islamic nation-state, it becomes clear that both Islamophobia and homophobia are products of white supremacy and that the "homophobic Muslim" is nothing more than a scapegoat.

## ***II. ISLAMOPHOBIA & ANTI-BLACKNESS INTERTWINED:***

First, it is vital to establish the anti-Black, white supremacist origin and nature of Islamophobia. Although there are particular axes along which anti-Blackness uniquely operates in the oppression of Black populations and individuals, anti-Blackness affects and forms the basis for all forms of racism. In a multi-faceted analysis of Islamophobia by the reputable news source *Al Jazeera*, Khaled Beydoun explores the deeply anti-Black nature of Islamophobia, which is at its root a racial project and the spawn of white supremacy. Beydoun writes that while giving a lecture on his book, *American Islamophobia: Understanding the Roots and Rise of Fear*, someone approached him and asked why a Black woman was on the cover (Beydoun). Their encounter exemplifies the dissonance between the public image of the Muslim figure that is propagated in the U.S. and the actual constituency and demographic composition of Muslims in the U.S. Not only do many contemporary Black Americans identify as Muslim, but 93 percent of the inhabitants of the North Africa-Middle East region are Muslim, along with 30 percent in sub-Saharan Africa (Desilver and Masci). Furthermore, "within the population of enslaved Africans who were brought to North America, historians estimate between 20-30% of them were Muslim" (Nessa). It is clear that a significant proportion of Black communities, both inside and outside of the U.S., practice Islam and are associated with it, contributing to dual, interdependent oppressions in the form of anti-Blackness and Islamophobia against Black Muslims. Beydoun goes on to say, "Islamophobia in the United States is, in great part, a racial project, spawned by a master discourse that drove European supremacy and today powered by popular views and state policy seeking to safeguard its domestic progeny, white supremacy" (Beydoun). Islamophobia, then, is inextricable from white supremacy and its objective of establishing anti-Blackness. White supremacy has necessitated anti-Blackness from its very conception, as white and Black were and are positioned as diametrically opposed to one another. After all, in the white supremacist project of Islamophobia, the proximity of Islam to Blackness and of its origin to East, rather than West,

forms the basis for the discrimination against its followers: “From 1790 until 1952, American naturalisation law mandated whiteness as a prerequisite for naturalised citizenship, and until the *Ex Parte Mohriez* decision 1944, Muslims were viewed as a distinct racial group that was not only non-white, but members of a faith held out to be the civilisational antithesis of whiteness” (Beydoun). Through the propagation of Orientalism, Islam has been situated as the metaphorical face of the East, running counter to the West and posing a threat to it. In other words, Orientalist logic—with its innate anti-Blackness—posits that Islam is the antipode of whiteness, which forms the basis for Islamophobia.

In the examination of Islamophobia in the U.S., the aforementioned question of citizenship and naturalization is an interesting one. Due to the anti-Black, white supremacist nature and function of the U.S. state from the very beginning of its foundation, the right of citizenship was instituted to legitimize and substantiate the superior social position of the white American, while necessarily excluding the Black individual. It was not until 1868 that the right of citizenship of former slaves and their Black progeny was inscribed into U.S. legislation through the Fourteenth Amendment (Art./Amend. XIV, Sec. 1). Until then, citizenship (and, more generally, legality) belonged to whites only. Importantly, Black folks living in America do not enjoy the same right of citizenship as their white counterparts even now. The Constitution may claim to protect them; reality is entirely different altogether. In his academic journal article “*Take Me Home*: Location, Identity, Transnational Exchange,” cultural critic and Black American Phillip Brian Harper reflects on the actual lived experiences of the Black U.S. “citizen.” He recounts having been awoken to their status as a second-class citizen during a business trip to Canada. He remarks,

[A]gainst all reason—and contrary to what I had been taught to expect in any number of other contexts—I had come to see myself as having an unproblematic claim at least to the title of U.S. citizenship, if not to all its perks and benefits, at most any point along the border with Canada—a typical condition of profound U.S.-nationalist myopia from which I was not adequately jolted until my experience in Toronto in December 1997. And yet, once that jolt took place, I immediately recurred to my default mode for negotiating the verge of subjective illegitimacy on which all nonnormative citizens are aware that we perennially teeter. (Harper 466)

Nonnormative citizens, particularly those who are Black, cannot lay claim to the same rights and protections as other American citizens. It is this same fundamental anti-Blackness in the exclusion of Harper from true U.S. citizenship access that precludes the Muslim person—similarly to and yet (at least in the case of non-Black Muslims) also differently from the Black person—from attaining full, legitimatized citizenship rights. The *Ex Parte Mohriez* decision 1944, as Beydoun cites, grants legal access to citizenship to Muslims in the U.S., but the anti-Blackness inherent in U.S. citizenship access and the proximity of the Muslim identity to Blackness (and, dialectically, its metaphysical distance from whiteness) together ensure that, regardless of their legal documentation status as citizens, Harper and the Muslim individual alike are not treated as such.

Yet another component of the anti-Blackness integral to Islamophobia is the criminalization of Muslims, involving both the ascription and subsequent presumption of criminality in People of

Color. Having established that anti-Blackness is at the core of Islamophobia, it is imperative to unearth the anti-Blackness that underscores the characterization of Muslims as violent and threatening. Political activist and Black feminist Angela Davis argues in the chapter “Slavery, Civil Rights, and Abolitionist Perspectives Toward Prison” of her book *Are Prisons Obsolete?*, that the prison industrial complex, or PIC, not only allows, but actually aims for, the continued enslavement of Black folks in the U.S. Thus, U.S. socio-political discourse axiomatically requires, as Frederick Douglass so fittingly put it, the “imputation of crime to color” (Davis 30). Davis expands upon Douglass’ assertion: “During the post-slavery era... black people were imprisoned under the laws assembled in the various Black Codes of the southern states, which, because they were rearticulations of the Slave Codes, tended to racialized penalty and link it closely with previous regimes of slavery” (Davis 31). Therefore, compounded upon the 13th Amendment, which contends that “[n]either slavery nor involuntary servitude, except as punishment for a crime whereof the party shall have been duly convicted, shall exist within the United States” (Art./Amend. XIII), it is evident that the intention of the PIC is to continue the legacy and practice of the enslavement of Black bodies.

Davis goes on to say, “In the aftermath of the September 11 attacks, vast numbers of people of Middle Eastern and South Asian heritage were arrested and detained by the police agency known as Immigration and Naturalization Services (INS)” (Davis 31). Her observation is echoed and supplemented by Beydoun, who declares,

The tropes that drove the formative legal position that Muslims were non-white, and oriented Islam as antithetical to whiteness, were ‘redeployed’ after the 9/11 attacks. That moment that spurred the bleak aftermath that gave rise to Islamophobia as we know it today, spearheaded by the creation of the Department of Homeland Security (DHS) and the initiation of the war on terror. Therefore, the ideas and images, distorted narratives and misrepresentations thrust to the surface after 9/11 that steer Islamophobia today were sowed and legally sealed by Orientalism, which must be understood as the mother of modern Islamophobia. (Beydoun)

The criminalization of Muslims following the September 11 attacks is, ergo, built upon Islam’s oppositional position in relation to whiteness and the foundational incrimination of Black communities in violence and delinquency. The so-called “war on terror” also invokes Orientalism, which denominates Muslims and “Eastern” peoples a threat to the U.S. empire, and moreover, its Orientalist derivation reveals that, as Sora Han put it, “the United States is not at war; the United States is war. For the system of white supremacy to stay in place, the United States must always be at war” (Smith 2-3). Waging wars against the Black community and, more generally, all communities of color—through criminalization and the construction of the PIC, in this case—upholds white supremacy and ensures that it continues to flourish.

### III. THE "HOMOPHOBIC MUSLIM" IN POPULAR DISCOURSE:

The attribution and imputation of crime to Muslims in particular is perhaps most evident in the highly sensationalized “homophobic Muslim” narrative. Specifically in white queer

theorization and critique, the Muslim (or, commonly in popular discourse, Middle Eastern, North African, or South Asian) figure often personifies the diametrical “other” of the modern, sexually liberated (white) queer individual. Feminist scholar Gayatri Gopinath delves into the relationship between the Muslim character and its supposedly oppositional white, queer character in her work, “Bollywood Spectacles: Queer Diasporic Critique in the Aftermath of 9/11.” As an example, she examines the photography of South Asian artist Parminder Sekhon, and in particular one piece entitled “Southall Market.” The photograph features Sekhon herself, a young, queer woman (in the nude), standing anterior to her older, Muslim mother. Read through a “liberal feminist” lens, Gopinath articulates that the image symbolizes the binary divisions between Sekhon and her mother—of tradition and modernity, queerness and heterosexuality, visibility and invisibility—which align with hegemonic representations of South Asian immigrants whom Western society deems unassimilable (Gopinath 166). Such a colonial reading exists not bearing in mind but in spite of the fact that “Sekhon’s queerness is formed in and through her relation to ‘home’ space, even as it radically disrupts and territorializes this space” (Gopinath 167). Western nationalist discourse, in and through its white supremacist framework, paints the Muslim as a sort of archaic figure, whose beliefs and faith are incongruous with the liberal “progress” of whiter, more WASP-centered socio-political spheres, and are supposedly fundamentally antiquated and homophobic.

A similar and perhaps even more harrowing instance of such an Islamophobic rendering of the Muslim individual occurs in queer circles in Germany, as depicted in the work “Trans Necropolitics: A Transnational Reflection on Violence, Death, and the Trans of Color Afterlife.” The authors meditate on “racist homonationalist mobilizing” and the moral panic over the “violent,” “homophobic Muslim” (Snorton and Haritaworn 67) in one gentrifying, migrant Turkish area of Germany. There, the authors write, the image of the homophobic migrant is spectacularized through the broadcasting of hate crimes against gender non-conforming subjects. The multiculturalism crisis in Europe and “Muslim test” of German citizenship give rise to the perfect conditions under which to center homonormative and homonationalist organizing working to eradicate the “homophobic Muslim” figure. Although the exploitation of poor, racialized sex workers has been unremarkable to German queer and trans activists for quite some time, one particular Drag Festival drew the attentions of such activists to the violence against trans individuals occurring in a migrant-majority neighborhood. White activists took to the streets with their megaphones and capitalized upon the sensationalization of the violence against trans sex workers by attributing all the blame to migrant youth (of color) gangs, despite the fact that most of the victims were and always have been *migrant* trans sex workers. Of course, such a distinction was not made (Snorton and Haritaworn 72). As with “Southall Market,” dominant white discourse and critique lends itself to the scapegoating of the “homophobic Muslim,” who is cast as anachronistic and threatening, under the guise of a homogenous, neoliberal, white movement towards “progress.”

#### **IV. THE COLONIALITY OF GENDER, SEXUALITY, & HOMOPHOBIA:**

Constructing the “homophobic Muslim,” however, disregards the colonialist origin of homophobia and functions only to further disseminate the seeds of white supremacy and

Islamophobia. Renowned Black feminist Cheryl Clarke, in her chapter “The Failure to Transform” of the book *Home Girls: A Black Feminist Anthology*, definitively derives the fundamental origin of homophobia and heterosexism as emerging from white, Western culture and practice. She calls it a “Puritan value” that “sex is for procreation, occurs only between men and women, and is only valid within the confines of a heterosexual marriage” (Clarke 199), as well as a “Western institution” and “Christian fundamentalist notion” that sex is viewed as “sin” (Clarke 201). Here, not only are heterosexism and homophobia decidedly Western in nature, but are also more explicitly non-Muslim, as they are Christian and more specifically Puritan. Furthermore, although Clarke herself argues that “we cannot rationalize the disease of homophobia among black people as the white man’s fault” (Clarke 197), she does not contend that the cause of homophobia within Black communities (or, in this case, Muslim communities) cannot be traced back to the white man, only the “disease” as it presently stands. Similarly, distinguished Black feminist Audre Lorde also comments on homophobia in the Black community in the piece “Age, Race, Class and Sex: Women Redefining Difference” in her book *Sister Outsider: Essays and Speeches*. Notably, she writes, “Black women who once insisted that lesbianism was a white woman’s problem now insist that Black lesbians are a threat to Black nationhood, are consorting with the enemy, are basically un-Black” (Lorde 121). Her assertion reveals an interesting additional layer of the homophobia existing within the Black community (which are not equal to but, for the purpose of analyzing the case of the “homophobic Muslim,” being extrapolated to communities of color more generally). When she says “basically un-Black,” she evokes a certain sense of perceived betrayal to the Black community on the part of gender/sexual minorities. Bearing in mind the intersectionality of oppression, the Black community may subscribe to an imposed practice of compulsory heterosexuality so as to attempt to shield itself from multiple, compounding axes of subjugation, rendering gender/sexual minorities as “traitors to the race” whose resistance to hegemonic white cultural norms necessitates and justifies the persistence of homophobia as a means by which to stifle and silence them. The pervasion of homophobia in the Black community and other communities of color does not, however, contradict its colonial, Puritan origins.

Moreover, Black feminist scholar Hortense Spillers exhumes the earliest vestige of the anti-Black constructs of normative gender and sexuality (and, by proxy, the pathology of homophobia) in her paramount work “Mama’s Baby, Papa’s Maybe: An American Grammar Book.” Spillers therein theorizes that the Middle Passage symbolized a sort of “rupture” in human history, leading to the “theft of the body” of the captive African, whose sexuality became a biological “Other” and who began to embody physical powerlessness at the hands of the white male captor (Spillers 67). The Black body being the most phenotypically distinct from the European captor, in terms of the “riffs of melanin in the skin” (Spillers 70), the captor embarked upon a “dehumanizing, ungendering, defacing project of African persons” (Spillers 72). Through this project, however, the white male paradoxically both ungendered the African body with reproductive capacity and simultaneously, by means of the *partus sequitur ventrem*, labeled such a body a “mother” in order to ascertain that the “slave mother is ‘forever entailed on all her remotest posterity’” (Spillers 79). Spillers goes on to say, “such naming is false because the female could not, in fact, claim her child, and false, once again, because ‘motherhood’ is not perceived in the prevailing social climate as a legitimate procedure of cultural inheritance” (Spillers 80). The African female, therefore,

epitomized the conduit between humanity and property, with her ungendered flesh receiving the title of “mother” only to relegate the slave condition to her offspring. The dehumanization of forcibly enslaved Africans, from the Middle Passage and onward, also created the circumstances that fostered the birth of white subjectivity, in terms of gender and sexuality. Gender, then, served only to assign fungibility to the African female and perpetuate the condition and practice of slavery, and it is therefore *necessarily* anti-Black. The coloniality and anti-Blackness of gender and sexuality also render any gender- or sexuality-based oppressions the product of white supremacy, including homophobia. Painting Islam as the face of homophobia and heterosexism, ergo, is not only entirely foundationless but additionally, due to the white supremacist and colonialist origins of both Islamophobia and homophobia, absurdly counterfactual.

## V. RELEVANT FINDINGS:

A quintessential contemporary exemplification of the Islamophobic nature of the “homophobic Muslim” and the white supremacist nature of homophobia is the case of the country of Iran and my own Muslim, Iranian grandmother. Currently, Iran is extremely intolerant of homosexuality and any gender/sexual deviance. Interestingly, however, although the Quran “address[es], and generally condemn[s], sexual relations between members of the same sex,” in premodern times, homoerotic poetry was very common. Historians believe that “[i]n late medieval Iran... Sufi and literary manifestations of homoeroticism became increasingly intertwined, resulting in the peculiarly Persian phenomenon of love lyrics whose referents—a boy? God? a woman?—regularly defy any attempt at a literalizing or reductionist analysis” (Rowson). Not only does premodern and medieval Iranian poetry include references to homoerotic sexual practices, but notably, it contains “love lyrics,” which verify the existence of a homoromantic erotic life for some individuals in Iran during these time periods. Present-day Iran, in contrast, is marked by post-imperialism. The 1979 Iranian Revolution itself occurred in large part due to the continued omnipresence of white forces—military and otherwise—in the Middle East. Iranian journalist Akbar Ganji documents, “in broad terms, Iranian revolutionaries wanted independence from foreign control and were critical of Western intervention in support of despotism. The Shah of Iran was considered to be the regional gendarme of American imperialism in the Middle East” (Ganji). European and American imperialism have touched every corner of the planet. In the particular case of Iran, white domination took place formally until 1979 (and informally continues to this day, in many ways), and it is impossible to know what attitudes towards homosexuality would be if not for the prevalence of white supremacy and its stakeholders. Thus, when I examine the case of my own homophobic grandmother, it is both reductive and inaccurate to dismiss her with a wave of the “homophobic Muslim” wand, and it is inconceivable to understand the reasons for which Western neoliberals have contrived such a category within which to contain her without deeply reckoning with white supremacy, anti-Blackness, and their manifestation in the form of Islamophobia.

## VI. CONCLUSION:

The scapegoating of the “homophobic Muslim” operates as a branch of the anti-Black construct of Islamophobia to further the greater Western project of white supremacy. Islamophobia contributes to Western beliefs about white supremacy and takes the form of the sensationalization of the “homophobic Muslim” in self-professedly “progressive” white spaces. White supremacy itself, of course, in turn functions to structurally and violently decimate the “homophobic Muslim,” ironically, at the same time that it claims that such a figure is a threat to the neoliberal democracy. In actuality, homophobia emerges in conjunction with the colonial, anti-Black notions of gender and sexuality, which are themselves fictions invented by the white male in the process of creating a slave-based economy, to use against the African female in order to make heritable the condition of enslavement. Homophobia, like Islamophobia, is the white man’s creation, rather than—as Western alarmist narratives would prefer to suggest—a pathology stemming from the followers of the Islamic faith. The “homophobic Muslim,” therefore, as part of the white supremacist imaginary, is a fabricated classification and—in order to dismantle the insidious Western notions of anti-Blackness, Islamophobia, and homophobia—must be deconstructed.

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# When Worlds Collide: Manichaeism and Christianity in Late Antiquity

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## ABSTRACT

Trade and travel played a tremendous role in connecting Sasanian and Roman empires in late antiquity. Yet this exchange between Persia and Rome was not confined to the movement of peoples and objects; it encompassed the movement of religious ideas. Giving readers a front-row seat to the turbulent 3rd - 5th centuries CE, this paper educates about the spread of religion between east and west—the reverberations of which are still felt today. The spread of Manichaeism, founded by 3rd century prophet Mani, is addressed. Manichaeism, because it did not survive as a global religion to the present, has often been overlooked by modern academia. Yet at its height, Manichaeism was one of the world's most prominent religions. Additionally, this paper explores the spread of Christianity in late antiquity. Although Christianity's diffusion has been widely studied, its penetration into the Arab world has often been overlooked. This paper explores the interchange between east and west.

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*“Let your brightness shine upon us, sweet source and breath of life!”*

Manichaean Parthian Hymn<sup>1</sup>

*“For mine eyes have seen thy salvation, which thou hast prepared before the face of all people,  
a light to enlighten the nations...”*

Luke 2:30-32<sup>2</sup>

“A thousand books will be preserved...  
they will come into the hands of the just and the faithful...”  
Manichaean Homilies 24:13<sup>3</sup>

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When this prophecy was written down nearly two thousand years ago, its scribe could never have imagined that these sacred books would come into the hands of not only “the just and the faithful,” but also modern academics. A series of remarkable archaeological discoveries in the late 20<sup>th</sup> century propelled academics into the study of Manichaeism, once a great world religion from the Sasanian Empire.<sup>4</sup> Exactly *how* this and other major religions spread between the empires of late antiquity has too often been overlooked.

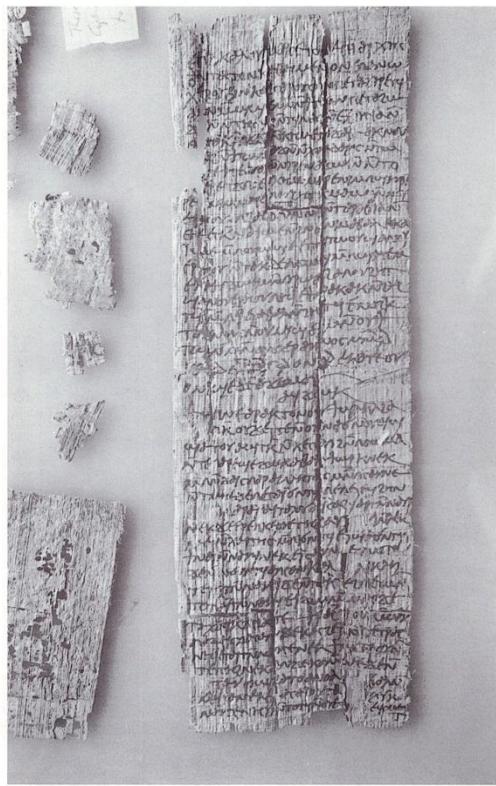
Late antiquity was marked not only by religious fervor, but by the clash of empires. Persia and Rome had long been rivals. The story of east and west was as bloody as it was old. Yet as the Sasanian Empire<sup>5</sup> arose from the ashes of the Parthians, contact between the east and west increased—as did inter-empire exchange. Complex systems of trade and travel existed between Sasanian Persia and the Roman-Byzantine Empire.<sup>6</sup> This exchange was not confined to the movement of people and objects; it encompassed the movement of religious ideas. During the turbulent 3<sup>rd</sup>-5<sup>th</sup> centuries CE, in the face of rabid animosity between empires, how was exchange possible? How and why did the rivaling religious ideas of Manichaeism and Christianity spread? In spite of—and in some cases because of—the prolonged tensions between the Roman and Sasanian empires, trade and travel between the rival powers fostered intense religious exchange, spreading Manichaeism west from Persia and Christianity east from Rome. Through exploring tensions, trade, and travel, the story of religious diffusion unfolds.

## CHRISTIANITY AND MANICHAEISM

Before studying how religious ideas spread, it is essential to have a basic grasp on the religions themselves. An explanation of Christian doctrine is far beyond the scope of this work, but a cursory explanation of eastern Christianity is necessary. Although Christianity’s diffusion has been studied from many angles, its penetration into the Arab world has often been overlooked. Christianity is typically thought of as “belonging largely to the Greco-Roman world and, eventually, to Europe. But this is to ignore the success of Christianity in regions far to the east of Europe...an extensive Third World of Christianity.”<sup>7</sup> Through Jesus of Nazareth and his followers, “the Christian movement initially erupted at the edge of the western, Roman side of the frontier.”<sup>8</sup> From its foundation, “Christianity spread east as well as west” – to Damascus, Edessa, Nisibis, Dura Europos, and Seleucia.<sup>9</sup> Surviving archaeological and textual sources chronicling the history of Christianity in Sasanian lands are limited;<sup>10</sup> nevertheless there are reliable sources documenting Christians beyond the Roman frontier, especially after the 3<sup>rd</sup> century CE.<sup>11</sup> Christian doctrines and practices changed in their new eastern environment.<sup>12</sup> Christianity in Sasanian lands “took different forms in these places.”<sup>13</sup>

And who were the Manichees?<sup>14</sup> Founded in the 3<sup>rd</sup> century CE by the Gnostic prophet Mani, Manichaeism<sup>15</sup> sprang from Sasanian Iran. Because it did not survive as a global religion, it has often been overlooked by modern academia.<sup>16</sup> Yet at its height, Manichaeism was “for a thousand years one of the major world religions.”<sup>17</sup> It was perhaps the “most maligned religion in history” and “for centuries it was known only through the polemics of its worst enemies, such as Augustine of Hippo,” who was a Manichaean for nine years before converting to Christianity.<sup>18</sup>

PLATE I.

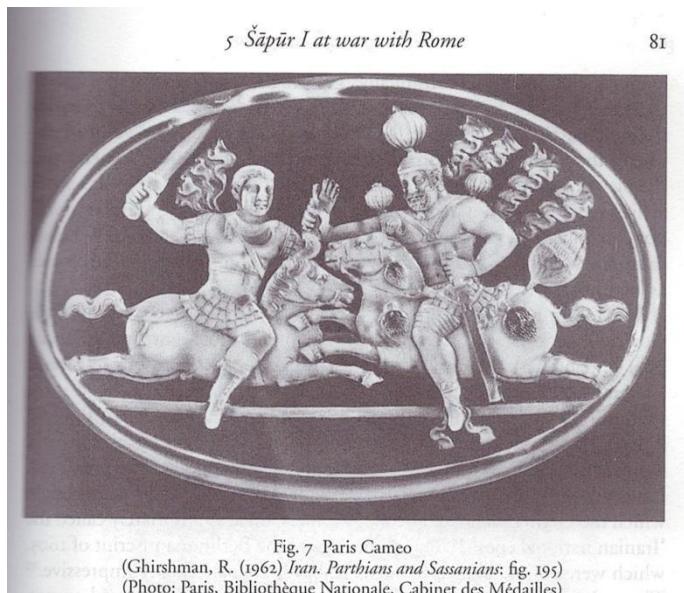
**Figure 1:** Manichaean Letter

Source: Mirecki and BeDuhn, *Emerging from Darkness*, 295.

Mani was born in Mesopotamia in 216 CE, descended from the royal house of Parthia. At the age of four, his father took him to the religious community of the Elchasaites.<sup>19</sup> There, he was exposed to many religions.<sup>20</sup> As a youth, he was inspired by visions; he claimed to be the last prophet and savior of mankind and set out to preach.<sup>21</sup> A syncretistic religion, Manichaeism incorporated Iranian, Babylonian, Indian, Jewish, and Christian elements.<sup>22</sup> His doctrines focused on a dualistic cosmology—the ancient war between light and darkness, spirit and body, mind and matter.<sup>23</sup> Of the spirit who spoke to him, Mani wrote: “He revealed to me...the mystery of the Depth and the Height...the Light and the Darkness...the conflict and the great war which the Darkness stirred up.”<sup>24</sup> Manichaeans and Christians both considered themselves “people of the book.”<sup>25</sup> Like Christianity, the religion largely spread through texts, psalms, songs, and prayers.<sup>26</sup> And spread it did—to North Africa, Italy, Egypt, even to China.<sup>27</sup> Though Manichees were persecuted and Mani himself died in chains in 276, the religion continued to grow—and came head to head with its arch-rival, Christianity. How did these religious ideas from enemy empires collide?

## TENSIONS

The world of late antiquity—not unlike the world of today—had a long history of east-west conflict. Fraught with tensions and fueled by old hatreds, the empires collided in continual warfare and conquest. The Parthians, originally nomads who emerged in the third century BC, were fierce.<sup>28</sup> Rome viewed their successors, the Sasanian dynasty, as a serious threat.<sup>29</sup> Initially, tensions had little to do with religion. In fact, early Christians went to Persia willingly. They were often safer and happier in the Parthian Empire, whose religious policy of non-interference protected them, than they were in the Roman Empire, where they were sent to the arena to die in droves.<sup>30</sup> It was not until after Zoroastrianism<sup>31</sup> was adopted by the Sasanian government in the late third century CE that Christians were treated with suspicion and violence.<sup>32</sup> Yet wars between Rome and Persia were primarily territorial in nature.<sup>33</sup> From the start, “it was above all the military confrontations that characterized Rome’s relations with her Eastern neighbors.”<sup>34</sup> Roman-Sasanian conflict was fierce even at the top. In 363 CE, Emperor Julian lost his life while advancing against Ktesiphon.<sup>35</sup> Many depictions exist of Valarian being captured by Shapur I.<sup>36</sup> From the top of society to the bottom, east-west conflict was fierce.



**Figure 2:** Shapur I captures Emperor Valarian

Source: Dignas and Engelbert, *Rome and Persia in Late Antiquity*, 81.

Although most wars were territorial, religion became a greater source of conflict under Constantine. People came from far and wide to pay homage at Constantine’s court. Showering him with gifts, visitors came from every corner of the known world—some with red faces, some with complexions “whiter than snow,” and others “blacker than ebony or pitch.”<sup>37</sup> After his conversion to Christianity,<sup>38</sup> and with the Edict of Milan in 313, Christianity was legalized.<sup>39</sup> What role did Constantine’s conversion play in relations between Persia and Rome?

There are two major scholarly trains of argument on this subject. The traditional argument, espoused by such historians as Abraham Yohannan, Beate Dignas, T.D. Barnes, and Engelbert Winter, is that Constantine viewed himself as the protector of Christians everywhere,<sup>40</sup> and that the dramatic religious changes during his reign exacerbated tensions between Rome and Persia. Original sources claim that persecution of Persian Christians began immediately after the Edict of Milan. Persian rulers now viewed the Christians in their empire as a threat—as co-religionists and sympathizers with Rome, perhaps even as spies.<sup>41</sup> Christians in the Sasanian Empire were declared “enemies of the state,” inaugurating a bloody cycle of persecutions.<sup>42</sup> To this day, “many [eastern Christians] still believe that the emperor’s conversion to Christianity inadvertently compounded the suffering of Christians in the East.”<sup>43</sup> Kyle Smith provides a dissenting historian’s voice. Smith contends that “the narrative about a Christian Roman emperor and a persecuting Persian king does not seem to have emerged until the early fifth century,” and that the sources which exist are conflicting and written decades or even centuries later.<sup>44</sup> “There is little evidence that [Constantine] saw himself as a savior of the Christians in Persia,” Smith maintains.<sup>45</sup> The conversion of Constantine “did not, at a stroke, transform the Christians of Persia into a fifth column of the Roman Empire.”<sup>46</sup>

A more accurate viewpoint strikes a balance between these conflicting arguments. The traditional view places too much emphasis on unreliable primary sources. Yet Smith is too quick to dismiss the Constantine’s impact. In one Syriac Christian account, Constantine is described as the patron of all Christians everywhere.<sup>47</sup> This implies that at least some eastern Christians viewed Constantine that way. Additionally, Constantine wrote a letter to the Sasanian king Shapur II on behalf of eastern Christians. This letter was recorded by the Greek Church father Eusebius, a close companion of the emperor. To Shapur, Constantine wrote: “...I heard that also many fine areas of Persia are adorned with this group of people, I mean the Christians (for it on their behalf that I am speaking),...I now commend these to you, because you are so powerful, I place them in your care, because your piety is as eminent.”<sup>48</sup> The letter held an undertone of threat.<sup>49</sup> Although it is unclear to what extent Rome’s Christianization influenced the situation of eastern Christians, religious tensions intensified between the two empires.

Who was this Persian king to whom Constantine wrote a letter? Shapur II,<sup>50</sup> an ardent Zoroastrian, who had built a reputation both as Christian-persecutor and military leader. According to a fifth-century martyrdom narrative, Shapur “continually raided the land of the Romans,”<sup>51</sup> taking city after city. But Shapur’s infamy comes mainly from his persecution of eastern Christians. Under Shapur, a series of *firmans*<sup>52</sup> were put in place. Christians were taxed exorbitantly; clergy were arrested; churches were burned to the ground; finally Christians were imprisoned and executed.<sup>53</sup> The hagiographical literature and martyrdom narratives documenting persecution must be weighed carefully for bias, exaggeration, and interpretation.<sup>54</sup> Even so, the number of accounts implies that the scope and intensity of persecution was great; “more than sixty narratives about Christian martyrs in Persia have survived;” two thirds are set in the fourth century; many are validated by non-Christian accounts.<sup>55</sup>

But Christians were not the only ones to face persecution. Manichaeans had their own enemies to confront. Mani’s followers were hated and viewed as heretics. Manichaeism had great

proselytizing success, extreme doctrinal positions, and powerful enemies—especially Zoroastrians and Christians.<sup>56</sup> Saint Augustine wrote many books against the Manichees.<sup>57</sup> “With what vehemence and bitter sorrow was I angered at the Manichees!” he lamented, “...and again I pitied them, for they knew not those Sacraments, those medicines, and were mad against the antidote which might have recovered them of their madness.”<sup>58</sup> Others were less compassionate. Eusebius Pamphilus wrote a scathing denunciation: “In the meantime, also, that madman Mane,<sup>59</sup> as he was called, well agreeing with his name, for his daemonic heresy, armed himself by the perversion of his reason, and the instigation of Satan, to the destruction of many. ...hence the impious name of the Manichees is spreading among many, even to the present day.”<sup>60</sup> Diocletian’s Edict against the Manichaeans in 297 not only sanctioned abuse, but encouraged it: “We are therefore intent on punishing the stubborn and deprived minds of the most useless people. ... The Manichaeans...have come into existence and entered our realm only recently from our enemy, the Persian people...”<sup>61</sup> This edict put forth an order – to punish them, steal their goods, seize their homes, burn their leaders.

Ironically, the oppression worked to strengthen and intensify religiosity, as often happens when religions are persecuted.<sup>62</sup> In fact, persecutions spurred on radical missionary efforts from both Manichaeans and Christians, and fostered greater connection between empires.<sup>63</sup> And although “the numerous military and religious conflicts between Rome and the Sasanian Empire impeded uninterrupted trade, both sides showed a strong interest in close economic relations.”<sup>64</sup>

## TRADE

In spite of tensions, Persia and Rome traded with one another, even during wartime. Briefly, a treaty of 298 made Nisibis the only place of exchange between the east and west. But this bore little impact on shipping, and soon widespread trade resumed.<sup>65</sup> Numerous treaties, diplomatic frameworks, and customs duties between the powers made for a “regulated exchange of goods.”<sup>66</sup>



Plate 4 Sasanian coin a) Obverse b) Reverse

**Figure 3:** Sasanian coins

*Source:* Daryaee, *Sasanian Persia*, 108.

Goods and ideas moved along major trade routes between the empires. In Sasanian lands, “these routes naturally avoided the difficult mountainous belt, and followed either the sea-coast, whether by road or ship, or the desert edge by caravan.”<sup>67</sup> Christianity spread via the major trade

routes.<sup>68</sup> Manichaeism did likewise, pushing west.<sup>69</sup> People often traveled these routes “as merchants or missionaries, sometimes as both.”<sup>70</sup>

Along these trade routes, cities grew, “a string of seaports along the coast, and a string of what may be called desert ports along the desert frontier...linked by towns in the mountain passes.”<sup>71</sup> Under the Parthians and Sasanians, Persia underwent massive urbanization.<sup>72</sup> Dams were built, irrigation canals constructed, government structure centralized, nomads taxed.<sup>73</sup> The use of official coinage attests that the Sasanians were moving towards a monetary economy.<sup>74</sup> Urbanization allowed for further trade between east and west. Economic activity within and between the empires was vibrant, as evidenced by the Roman bullae and seals found in Persia.<sup>75</sup> Caravan cities, such as Hatra and Palmyra, served as junctions for caravan routes, protected the traffic of goods, and fostered intense interchange of ideas.<sup>76</sup> Cities were hot spots for exchange.

Within Persian cities, the main economic activity was done by *wazarganan*.<sup>77</sup> Foreign products entered the market via caravans, led by *sartwa*.<sup>78</sup> Bazaars were the main form of marketplace. In the Sasanian Empire, “merchants were looked down upon, below the three traditional classes of priests, warriors and farmers.”<sup>79</sup> Many Persians did not want to be viewed negatively; Sogdians and Christians settled in the Persian Empire to trade as merchants since they were already stigmatized and it made little difference to them.<sup>80</sup> This helped the spread of Christianity in Persia.

In the west, too, both in Mesopotamia and the Roman Empire, cities were hubs of exchange. A commercial-geographical survey written 350-362 vividly describes Nisibis and Edessa as cities “full of merchants and good hunters who are wealthy as well as equipped with all sorts of goods. For they acquire their goods directly from the Persians, sell them throughout the entire Roman Empire and then engage in trade with the goods they purchase there.”<sup>81</sup>

The exchange of goods and ideas between the rival powers was not limited to regional trade. One of the greatest trade veins was the Silk Road. A misnomer, the “Silk Road” is a blanket term for the many trade routes that crisscrossed Central Asia.<sup>82</sup> Trade relations between the Far East and the Graeco-Roman world had existed for centuries, but intensified in late antiquity.<sup>83</sup> Luxury goods were imported from the Far East – spices, incense, gems, precious stones, ivory, wild beasts, even enslaved Indian eunuchs.<sup>84</sup> In exchange, glassware was imported from the Roman Empire.<sup>85</sup> Glassware “has been excavated at sites in Iraq, Nineveh, and Veh Ardashir, and compositional analyses of several of the pieces” prove they were of Late Roman make.<sup>86</sup> The Sasanian kingdom, between China and Rome, “held the key to trade.”<sup>87</sup> Continually, and especially during wartime, Rome sought alternative routes to the Far East, hoping to circumvent the Sasanians.<sup>88</sup> But both empires depended on one another. And wherever an exchange of goods occurred along these vast routes, there followed an exchange of ideas. Manichaeism spread via traders and travelers all the way to China.<sup>89</sup> Collections of Manichaean texts in multiple languages have been uncovered in Algeria, Egypt, Italy, and China in what were once major trade depots.<sup>90</sup> Clearly, trade and religion were interconnected. But trade was not the only kind of travel which facilitated exchange.

## TRAVEL

Perhaps the most obvious way in which religion travels is through the movement of missionaries. Manichaeism spread through missionary activity from the start. Mani himself traveled extensively and “engaged in missionary activity.”<sup>91</sup> He sent out missionaries east and west to preach and found monasteries.<sup>92</sup> The *Acta Archelai* recorded the first known encounter of Manichaeism on Roman soil, when Mani went to spread his “heresy” under the rule of Emperor Probus.<sup>93</sup> Throughout the eastern provinces, “the spread of Manichaeism coincided with a wave of wandering, begging monks and missionaries.”<sup>94</sup>

Christianity, too, spread through missionary activity. The Biblical book of Acts records people present at the Pentecost<sup>95</sup> – “Parthians, Medes and Elamites; residents of Mesopotamia, Judea and Cappadocia, Pontus and Asia, Phrygia and Pamphylia, Egypt and the parts of Libya near Cyrene; visitors from Rome (both Jews and converts to Judaism); Cretans and Arabs—we hear them declaring the wonders of God in our own tongues!”<sup>96</sup> Undoubtedly, many returned to eastern homelands to tell of their experiences. Missionary bases and bishops spread over vast regions—Arbela,<sup>97</sup> Edessa,<sup>98</sup> Bactria.<sup>99</sup> Sixty Christian tombs and a monastery-church were excavated on the small island of Kharg in the Persian Gulf, dated to 250 CE.<sup>100</sup>

Another, governmental type of missionary activity involved diplomatic missions sent between rivaling courts. Mani and his followers attempted to win over rulers, both in Persia and Rome.<sup>101</sup> Christians sent embassies of state-sanctioned missionaries to the east. Socrates of Constantinople, an ecclesiastical historian, described an incident in which two Roman Christians healed the son of Yazdgard,<sup>102</sup> the Persian king. These Christians, he wrote, “drove out a demon that was torturing the king’s son.”<sup>103</sup> Yazdgard did not convert to Christianity; yet he was now tolerant of Christians.

Yet most religious intermixing happened on the frontier. Border regions “were not only major economic centers in their own right, but also zones of cultural interaction, mediation, and frontier control” where ideas were shared.<sup>104</sup> “The political frontier offered no obstacle” for the exchange of ideas; “designed to stop armies, it took little notice of small groups of travelers.”<sup>105</sup> The Tigris and Euphrates served as land markers, but the borderlands were diverse, geographically and culturally. The borderland people shared “a common language, customs, and a way of life [which] furthered close relations among the population...a link between trade and religion can be observed.”<sup>106</sup>

In the spread of Christianity, the most influential means of travel involved deportations. Historians Daryaee, Dignas, and Winter argue that the spread of Christianity into Sasanian lands was largely a result of the mass deportations of Christians that took place after Persian conquests. Under numerous Persian kings, Roman POWs were deported to the Sasanian Empire.<sup>107</sup> Deported skilled laborers were given homes and brought into the Sasanian Empire for their western know-how. “The capture of Roman engineers and skilled workers and craftsmen and their deportation into newly built or older cities brought in new workforces which could augment the shortage of population and train the Persian population,” and wherever these workers were

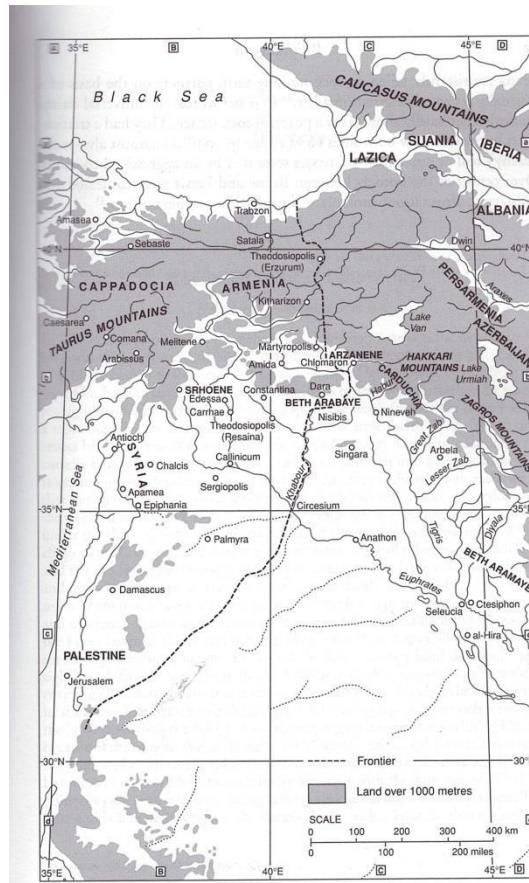
brought, the Christian population significantly increased.<sup>108</sup> The Nestorian *Chronicle of Se'ert* explained: “When Sapur left the Byzantine lands he brought with him captives whom he settled in Iraq, Ahwaz, Persia and in the cities founded by his father. ... distributing among them lands to cultivate and houses to live in, and because of this the number of Christians in Persia increased.”<sup>109</sup> As a result, “Western ideas and culture reached Iran.”<sup>110</sup> Travel—whether by missionaries, diplomats, or humble laborers—helped to spread religion between east and west.

## SIGNIFICANCE AND LEGACY

Tensions, trade, and travel between the Roman and Sasanian empires fostered intense religious exchange. The spread of Christianity and Manichaeism were large in scope and even larger in legacy. Christianity penetrated deeply and widely into the east in late antiquity.<sup>111</sup> In fact, “the first Christian missionaries who brought their faith to China in the seventh century were from Iran, and for the next hundred years, Chinese sources continued to refer to Christianity as ‘the Persian religion.’”<sup>112</sup> Whatever the actual numbers of Christians in Sasanian Persia, “their importance was disproportionately high, especially in the realm of higher learning; ...Christians, with their cosmopolitan influences and knowledge of languages, were in a position to act as transmitters of culture.”<sup>113</sup> For example, the most important academic institution of the Sasanian era was the school at Gondešapur in Skuzestan.<sup>114</sup> The academy was established as a Nestorian seminary in 260, was built by Roman POWs, and “the original curriculum included biblical exegesis, theology, and Greek medicine.”<sup>115</sup> Although in centuries to come Islam would pose a threat to Christianity, the roots which Christian religion established dramatically altered the Middle East in the Sasanian era and beyond.

Manichaeism too was large in scope and profound in legacy. It was “virtually stamped out in the Roman Empire and vigorously persecuted by the Sasanians.”<sup>116</sup> Because it did not survive into the modern age, “Manichaeism has not received the attention due a world religion.”<sup>117</sup> What is the legacy of a ‘dead’ religion? Its first importance is that it was once one of the largest religions on earth.<sup>118</sup> But above all, “the major importance of Manichaeism in the history of religions may be precisely this: it compelled other religions to defend and articulate themselves, eventually resulting in their taking the forms by which we know them today... it was by engaging in polemics primarily with Manichaeism that Christianity, Zoroastrianism and Islam staked out their own orthodoxies.”<sup>119</sup> By its own death, Manichaeism strengthened other faiths.

When twentieth century archaeologists unfurled the ancient sheets of papyrus in Manichaean texts, they were amazed to rediscover the religious world of late antiquity. Manichaeism and Christianity, spreading east and west and sprawling over multiple continents, irrevocably altered the world of late antiquity—and their legacies continue to be felt to the present day.



Map 4: The Roman–Sasanian Frontier in late antiquity

**Figure 4:** The frontier

Source: Dignas and Engelbert, *Rome and Persia in Late Antiquity*, 61.

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## NOTES

<sup>1</sup> Klimkeit, *Gnosis on the Silk Road*, 32.

<sup>2</sup> Luke 2:30-32, King James Version Bible.

<sup>3</sup> Mirecki and BeDuhn, *Emerging from Darkness*, vii.

<sup>4</sup> Ibid.

<sup>5</sup> The Sasanian Empire is also called the Sasanid, Sassanid, or Neo-Persian Empire, though it was known to its inhabitants as Ērānshahr in Middle Persian. It was named after the House of Sasan, reigning from 224-651 CE. Succeeding the Parthian Empire in Persia, the Sasanians were one of the greatest powers on earth, neighbors and arch-rivals to the Roman-Byzantine Empire for over 400 years.

<sup>6</sup> The Byzantine Empire, also called the Eastern Roman Empire, was the continuation of the Roman Empire in the east, where Constantinople (modern-day Istanbul) was the capital city. It was at its height during late antiquity and the Middle Ages, and continued to exist for a thousand years after the fall of the western Roman Empire.

<sup>7</sup> Brown, *Wealth, Work, and the Holy Poor*, 235.

<sup>8</sup> Mirecki and BeDuhn, *Frontiers of Faith*, 1.

<sup>9</sup> Ibid., 2.

<sup>10</sup> Payne, "Christianity and Iranian Society in Late Antiquity," 33-34. Smith, *Constantine and the Captive Christians of Persia*, 129.

<sup>11</sup> Mirecki and BeDuhn, *Frontiers of Faith*, 2.

<sup>12</sup> Foltz, *Religions of Iran*, 107.

<sup>13</sup> Mirecki and BeDuhn, *Frontiers of Faith*, 2.

<sup>14</sup> Adherents to Manichaeism were called by a variety of names: Manichaeans, Manicheans, or Manichees.

- <sup>15</sup> The words “Manichaeism” and “Manichee” are from a Syriac term, *Mani de hayye*, meaning “the Mani of Life”, named after the preacher of life. Byzantine writers coined the derogatory term “mania” for the religion, a pun on the founder’s name. For further information, read: Brown, *Through the Eye of a Needle*, 156.
- <sup>16</sup> Klimkeit, *Gnosis on the Silk Road*, xiv.
- <sup>17</sup> Foltz, *Religions of Iran*, 137.
- <sup>18</sup> Ibid.
- <sup>19</sup> The Elchasaites were a Jewish-Christian cult sect.
- <sup>20</sup> Klimkeit, *Gnosis on the Silk Road*, 2.
- <sup>21</sup> Wood, *The Silk Road*, 70-73.
- <sup>22</sup> Mirecki and Beduhn, *The Light and the Darkness*, 2.
- <sup>23</sup> Dignas and Engelbert, *Rome and Persia in Late Antiquity*, 277-78.
- <sup>24</sup> Kephalaia, 14, 29-15, 24: cited by Klimkeit, *Gnosis on the Silk Road*, 3
- <sup>25</sup> Dilley, *Religious Intercrossing*, 33.
- <sup>26</sup> Klimkeit, *Gnosis on the Silk Road*, 30.
- <sup>27</sup> Ibid., xiii.
- <sup>28</sup> Dignas and Engelbert, *Rome and Persia in Late Antiquity*, 11-12.
- <sup>29</sup> Ibid., 18.
- <sup>30</sup> Smith, *Constantine and the Captive Christians of Persia*, 129.
- <sup>31</sup> Zoroastrianism, founded by Zoroaster, was a monotheistic, pre-Islamic religion of ancient Persia.
- <sup>32</sup> Foltz, *Religions of Iran*, 107.
- <sup>33</sup> Smith, *Constantine and the Captive Christians of Persia*, 51.
- <sup>34</sup> Dignas and Engelbert, *Rome and Persia in Late Antiquity*, 70.
- <sup>35</sup> Ktesiphon was the Sasanian capital.
- <sup>36</sup> Dignas and Engelbert, *Rome and Persia in Late Antiquity*, 81-83.
- <sup>37</sup> Eusebius, “Life of Constantine.” Dignas, *Rome and Persia in Late Antiquity*, 7.
- <sup>38</sup> After his success at the Battle of the Milvian Bridge, which he believed he won by the help of God, Constantine converted to Christianity.
- <sup>39</sup> Later, in 380 CE, Christianity was declared the official state religion.
- <sup>40</sup> Barnes, *Constantine and the Christians of Persia*, 131.
- <sup>41</sup> Dignas and Engelbert, *Rome and Persia in late antiquity*, 33.
- <sup>42</sup> Ibid., 219.
- <sup>43</sup> Smith, *Constantine and the Captive Christians of Persia*, 4.
- <sup>44</sup> Ibid., 7.
- <sup>45</sup> Smith, *Constantine and the Captive Christians of Persia*, 10.
- <sup>46</sup> Ibid.
- <sup>47</sup> Brock, “The History of the Holy Mar Ma’in.” Smith, *Persian Martyr Acts in Syriac*, 33-34.
- <sup>48</sup> Eusebius, “The Life of Constantine.” Dignas, *Rome and Persia in Late Antiquity*, 220.
- <sup>49</sup> Barnes, *Constantine and the Christians of Persia*, 132.
- <sup>50</sup> Shapur II, also spelled Sapur in earlier documents, reigned as king of Sasanian Persia for his entire 70-year lifespan, from 309 to 379 CE.
- <sup>51</sup> Smith, *The Martyrdom and History of Blessed Simeon bar Sabba'e*, 4.
- <sup>52</sup> Firman: a Sasanian official edict or royal mandate
- <sup>53</sup> Smith, *Constantine and the Captive Christians of Persia*, 5.
- <sup>54</sup> Ibid., 100.
- <sup>55</sup> Ibid., 99.
- <sup>56</sup> Foltz, *Religions of Iran*, 137.
- <sup>57</sup> Brown, *Through the Eye of a Needle*, 170.
- <sup>58</sup> Augustine, *Confessions*, 111.
- <sup>59</sup> Mane : an alternative spelling of Mani
- <sup>60</sup> Eusebius, *Ecclesiastical History of Eusebius Pamphilus*. Crusé and Valois, 309.
- <sup>61</sup> “Diocletian’s Edict against the Manichaeans,” 297 CE, Dignas, *Rome and Persia in Late Antiquity*, 217.
- <sup>62</sup> Brown, *Through the Eye of a Needle*, 158.
- <sup>63</sup> Ibid.
- <sup>64</sup> Dignas and Engelbert, *Rome and Persia in Late Antiquity*, 195.
- <sup>65</sup> Ibid., 200.
- <sup>66</sup> Ibid., 195.
- <sup>67</sup> Jones, *Cities of the Eastern Roman Provinces*, 227.
- <sup>68</sup> Harrak, “Trade Routes and the Christianization of the Near East,” 46-61.
- <sup>69</sup> Foltz, *Religions of Iran*, 150.
- <sup>70</sup> Smith, *Constantine and the Captive Christians of Persia*, 129.
- <sup>71</sup> Jones, *Cities of the Eastern Roman Provinces*, 227.
- <sup>72</sup> Dignas and Engelbert, *Rome and Persia in Late Antiquity*, 135.
- <sup>73</sup> Ibid., 134.

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- <sup>74</sup> Daryaee, *Sasanian Persia*, 145.
- <sup>75</sup> Ibid., 141.
- <sup>76</sup> Dignas and Engelbert, *Rome and Persia in Late Antiquity*, 163.
- <sup>77</sup> Wazarganan: Persian merchants
- <sup>78</sup> Sartwa: caravan leaders
- <sup>79</sup> Daryaee, *Sasanian Persia*, 143.
- <sup>80</sup> Ibid.
- <sup>81</sup> “Expositio totius mundi et gentium.” Dignas, *Rome and Persia in Late Antiquity*, 197.
- <sup>82</sup> Rezakhani, “The road that never was,” 420.
- <sup>83</sup> Dignas and Engelbert, *Rome and Persia in Late Antiquity*, 196.
- <sup>84</sup> Ibid., 195.
- <sup>85</sup> Simpson, *Sasanian Glassware*, 95.
- <sup>86</sup> Ibid., 80.
- <sup>87</sup> Daryaee, *Sasanian Persia*, 149.
- <sup>88</sup> Dignas and Engelbert, *Rome and Persia in Late Antiquity*, 202.
- <sup>89</sup> Wood, *The Silk Road*, 66.
- <sup>90</sup> Mirecki and BeDuhn, *Emerging from Darkness*, viii.
- <sup>91</sup> Klimkeit, *Gnosis on the Silk Road*, 3.
- <sup>92</sup> Ibid., 202.
- <sup>93</sup> “Acta Archelai.” BeDuhn and Mirecki, *Frontiers of Faith*, 9.
- <sup>94</sup> Brown, *Wealth, Work and the Holy Poor*, 242.
- <sup>95</sup> Pentecost: the Christian festival day celebrating the Ascension of Jesus to heaven, and the immediately subsequent descent of the Holy Spirit on the disciples
- <sup>96</sup> Acts 2:9, New International Version.
- <sup>97</sup> Arbela: a city, now called Irbil, in modern-day Iraq
- <sup>98</sup> Edessa: now Urfa in southeastern Turkey
- <sup>99</sup> Foltz, *Religions of Iran*, 107.
- <sup>100</sup> Foltz, *Religions of Iran*, 107.
- <sup>101</sup> Klimkeit, *Gnosis on the Silk Road*, 3.
- <sup>102</sup> Yazdgard, a Sasanian Persian king, ruled 399-420 CE.
- <sup>103</sup> Socrates of Constantinople. Dignas, *Rome and Persia in Late Antiquity*, 380-440.
- <sup>104</sup> Simpson, *Sasanian Glassware*, 78.
- <sup>105</sup> Mirecki and BeDuhn, *Frontiers of Faith*, 6.
- <sup>106</sup> Dignas and Engelbert, *Rome and Persia in Late Antiquity*, 201.
- <sup>107</sup> Dignas and Engelbert, *Rome and Persia in Late Antiquity*, 23.
- <sup>108</sup> Daryaee, *Sasanian Persia*, 135.
- <sup>109</sup> “Chronicle of Se’ert.” Dignas, *Rome and Persia in Late Antiquity*, 255.
- <sup>110</sup> Dignas and Engelbert, *Rome and Persia in Late Antiquity*, 254.
- <sup>111</sup> Payne, PhD diss. “Christianity and Iranian Society in Late Antiquity, ca. 500-700 C.E.” Smith, *Constantine and the Captive Christians of Persia*, 129.
- <sup>112</sup> Foltz, *Religions of Iran*, 106.
- <sup>113</sup> Foltz, *Religions of Iran*, 111.
- <sup>114</sup> Skuzestan: a southwestern Iranian province
- <sup>115</sup> Foltz, *Religions of Iran*, 111.
- <sup>116</sup> Ibid., 143.
- <sup>117</sup> Klimkeit, *Gnosis on the Silk Road*, xiv.
- <sup>118</sup> Foltz, *Religions of Iran*, 137.
- <sup>119</sup> Foltz, *Religions of Iran*, 151.