

Duquesne University

Duquesne Scholarship Collection

Graduate Student Research Symposium

2015-11-06

GSRs Event Program Booklet 2015

Office of Research

Follow this and additional works at: <https://dsc.duq.edu/gsr>

GSRs Event Program Booklet 2015. (2015). Retrieved from <https://dsc.duq.edu/gsr/2015/proceedings/1>

This Paper is brought to you for free and open access by Duquesne Scholarship Collection. It has been accepted for inclusion in Graduate Student Research Symposium by an authorized administrator of Duquesne Scholarship Collection.



The 3rd Annual
**Graduate Student
Research Symposium**

Friday, November 6, 2015

Power Center Ballroom
Duquesne University

Sponsored by
Academic Affairs, Office of the Provost,
and Office of Research.



The third annual

Graduate Student

Research Symposium



November 6, 2015
Power Center Ballroom
Duquesne University



PROCEEDINGS

TABLE OF CONTENTS



Acknowledgements.....	3
Schedule.....	4
Oral Presentations Schedule.....	5
Award Winners.....	9
Oral Presenters' Papers.....	11
Abstracts.....	112
Index by School.....	165

ACKNOWLEDGEMENTS

The organizers would like to thank all of the faculty mentors for their service and support of our graduate scholars.

A special thank you to the Bayer School of Natural & Environmental Sciences for their generous donation of the corkboards.

GSRs Student Planning Committee:

Barbara Postol | Daniel Hannah | Ian Butcher | Paul Cacolice
Ian Shadle | Julie Michael | Lisa Enright | Amanda Griffin

We would also like to thank the following organizations and individuals for their generous support of this important event:

Bayer School of Natural & Environmental Sciences
Center for African Studies
Center for Catholic Intellectual Tradition
Center for Spiritan Studies
Enrollment Management Group
McAnulty College and Graduate School of Liberal Arts
School of Nursing
Office of the Provost
Office of Research, Christine Pollock & Mary McConnell
Phi Kappa Phi, National Honors Society

SCHEDULE



8:30 to 10:00	POSTER PARTICIPANT SET-UP
10:00	DOORS OPEN TO THE PUBLIC Opening Remarks
10:00 to 11:00	OPEN POSTER SESSION - Power Center-Section C Guests are invited to walk around, peruse student projects, and engage w/ students.
11:00 to 12:00	ORAL PRESENTATIONS SESSION 1 - A & B Session 1-A-Power Center-Section A Session 1-B-Power Center-Section B Details on Page 6 ****POSTER SESSION CLOSED AT THIS TIME****
12:00 to 1:00	POSTER SESSION - <i>Power Center-Section C</i> Guests are invited to walk around, peruse student projects, and engage w/ students. Oral Presenters from Session 1 will be available to answer questions. Boxed Lunches provided for participants
1:00 to 2:30	ORAL PRESENTATIONS SESSION 2 - A& B Session 2-A Power Center-Section A Session 2-B Power Center-Section B Details on Page 7 ****POSTER SESSION CLOSED AT THIS TIME****
2:30 to 3:00	SNACK BREAK Oral Presenters from Session 2 will be available to answer questions. Judges make final decisions
3:00	AWARDS & CLOSING REMARKS

ORAL PRESENTATIONS – SESSION 1

Power Center Ballroom

SECTION A

11:00 **Cebrail Karayigit**
School of Education - Counselor Education
& Supervision
Faculty Advisor: David L. Delmonico, Ph.D.
Abstract Number: 75
The Effectiveness of Homework
Assignments in Cognitive Behavioral
Therapy for Public Speaking Anxiety: A Case
Study

11:15 **Ben Mast**
School of Education - Department of
Counseling, Psychology, and Special
Education
Faculty Advisor: Carla Meyer, Ph.D.
Abstract Number: 78
Moving beyond the boat: Using young adult
literature to scaffold teacher candidates'
understanding of the immigration
experience

11:30 **Jacob Keeney**
Bayer School of Natural and Environmental
Sciences – CERE
Faculty Advisor: John Stolz, Ph.D.
Abstract Number: 59
Chronic Toxicity of Crude 4-
Methylcyclohexanemethanol to the
Crustacean *Ceriodaphnia dubia*

SECTION B

11:00 **Steven Perry**
McAnulty College & Graduate
School of Liberal Arts - Theology
Faculty Advisor: Sebastian
Madathummuriyil, Ph.D.
Abstract Number: 64
Evangelicals at the Climate Change
Crossroads

11:15 **Bethany Kaser**
McAnulty College and Graduate
School of Liberal Arts – English
Faculty Advisor: Anna Gibson, Ph.D.
Abstract Number: 76
Gender Roles and Miniature
Passengers: The Implications of the
Victorian Child in Limbo Between
the Domestic and Public

11:30 **Lyndsie Ferrara**
McAnulty College and Graduate
School of Liberal Arts – Center for
Healthcare Ethics
Faculty Advisor: Gerard Magill,
Ph.D.
Co-Advisor: James B. Schreiber,
Ph.D.
Abstract Number: 72
How Abductive Reasoning Impacts
Criminal Investigations

11:45 **Lu Liu and Michele Herneisey**
Mylan School of Pharmacy
Faculty Advisor: Jelena Janjic, Ph.D.
Abstract Number: 60
Pain Nanomedicine: COX-2
Targeted Theranostic
Nanoemulsions Redesign

ORAL PRESENTATION - SESSION 2

Power Center Ballroom

SECTION A

1:00 **Dipy Vasa & Jesse Yu**
Mylan School of Pharmacy
Faculty Advisor: Peter Wildfong, Ph.D.
Abstract Number: 68
Understanding the thermodynamic stability relationship of ribavirin polymorphs through estimation of transition temperature

1:15 **Daniel Hurst**
McAnulty College & Graduate School of Liberal Arts – Center for Healthcare Ethics
Faculty Advisor: Henk ten Have, Ph.D.
Abstract Number: 73
“Right to Try” Legislation: A Complicated Ethical Matter

1:30 **Lois Schertz**
School of Nursing
Faculty Advisor: Mary Loughron, Ph.D.
Abstract Number: 79
Evaluation of Liposomal Bupivacaine in Total Knee Arthroplasty

1:45 **Thomas Wright, Christopher Raybuck and Katheryn Wendekier**
Mylan School of Pharmacy
Faculty Advisor: Jane Cavanaugh, Ph.D.
Abstract Number: 66
Simultaneous Inhibition of the PI3K/Akt and MEK5/ERK5 Cascades Reduce Proliferation and Migration in Hormonally Diverse Breast Cancer Cell Lines

SECTION A

SECTION B

1:00 **Etchi Besem**
McAnulty College and Graduate School of Liberal Arts – Theology
Faculty Advisor: Marie Baird, Ph.D.
Abstract Number: 71
From the Cross to Holy Orders: Chauvet’s Symbolic Theology and the Sacramental Implication of Women’s Presence on Mt Golgotha in Jn. 19:25-28

1:15 **AJ Bisesi**
McAnulty College and Graduate School of Liberal Arts – Social and Public Policy
Faculty Advisor: Michael Irwin, Ph.D.
Abstract Number: 69
A Case Study: Promoting an Equitable Eating-out Food Environment through the Application of a Food Justice Frame

1:30 **Kevin Lachaud**
A.J. Palumbo School of Business Administration- ISM
Faculty Advisor: Wenqi Zhou, Ph.D.
Abstract Number: 77
Temporally Pricing low or Spotlighting Your App? : An empirical study on Amazon Free App of the Day

1:45 **Clement Kanu**
McAnulty College & Graduate School of Liberal Arts – English
Faculty Advisor: Marie Baird, Ph.D.
Abstract Number: 74
Embodied Narrative and the Formation of Virtue: Communitarian-Anamnetic Framework in Traditional African Ethic

SECTION B

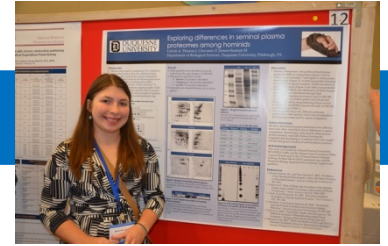
2:00 **Jordan Potter**
McAnulty College and Graduate
School of Liberal Arts – Center for
Healthcare Ethics
Center for Healthcare Ethics
Faculty Advisor: Gerard Magill,
Ph.D.
Abstract Number: 65
An Ethical and Practical Analysis of
the Benefits Associated with
Compensated Live Organ Donation

2:15 **Benjamin Meyer**
Mary Pappert School of Music –
Guitar
Faculty Advisor: Zvonimir Nagy,
Ph.D.
Abstract Number: 63
Numbers and Proportion in
Performing Arts: An Exploration of
Musical Space in Stravinsky’s Agon

2:00 **Zachary Dehm**
McAnulty College and Graduate School
of Liberal Arts – Theology
Faculty Advisor: Marie Baird, Ph.D.
Abstract Number: 70
Can Socially Responsible Investment
Create a Preferential Option for the
Poor?

2:15 **Theresa Sullivan**
McAnulty College and Graduate School
of Liberal Arts-English
Faculty Advisor: Jim Purdy, Ph.D.
Abstract Number: 26
“A Vlog Universally Acknowledged,” a
digital analysis of “The Lizzie Bennet
Diaries,” a vlog adaptation of Jane
Austen’s Pride and Prejudice

SPECIAL AWARDS



**Bayer School for Natural and Environmental Sciences
Award for Graduate Research-Excellence in Graduate Research:
2 awards, \$300 each**

Katelyn Sadler, Allison Trouten

Asymmetrical involvement of the left and right central amygdala in bladder pain
Biological Sciences | Bayer School of Natural and Environmental Sciences
Faculty Advisor: Benedict Kolber, Ph.D. | Abstract Number: 44

Jessica Thomas, Andy M. Magyan, Peter E. Freeman

Variation in corticosterone in male and female free-living salamanders
Biological Sciences | Bayer School of Natural and Environmental Sciences
Faculty Advisor: Sarah Woodley, Ph.D. | Abstract Number: 53

Center for African Studies

Award for Graduate Student Research: \$300

Clement Kanu

Embodied Narrative and the Formation of Virtue: Communitarian-Anamnetic Framework in
Traditional African Ethic
Theology | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor: Marie Baird, Ph.D. | Abstract Number: 74

**Center for Catholic Intellectual Tradition & Spiritan Studies Award
for Graduate Student Research: 2 awards, \$300 each**

Zachary Dehm

Can Socially Responsible Investment Create a Preferential Option for the Poor?
Theology | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor: Marie Baird, Ph.D. | Abstract Number: 70

Clement Kanu

Embodied Narrative and the Formation of Virtue: Communitarian-Anamnetic Framework in
Traditional African Ethic
Theology | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor: Marie Baird, Ph.D. | Abstract Number: 74

**McAnulty College and Graduate School of Liberal Arts:
Outstanding Poster or Presentation: \$250**

Elizabeth Brown

Exploring Home: Urban Women's Experiences in a Ruptured Community
Psychology | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor: Lori Koelsch, Ph.D. | Abstract Number: 8

School of Nursing Award for Graduate Research: \$250

Lois Schertz

Evaluation of Liposomal Bupivacaine in Total Knee Arthroplasty
School of Nursing Graduate Programs | School of Nursing
Faculty Advisor: Mary Loughron, Ph.D. | Abstract Number: 79

Phi Kappa Phi, National Honors Society

Outstanding Research Award: \$500

Matthew Jevit, Josie Coverdale, Christine Warzecha

A Characterization of Equine Microflora in Response to a High Carbohydrate Diet: Comparing Fecal and Cecal Samples
Biology | Bayer School of Natural and Environmental Sciences
Faculty Advisor: Jan Janecka, Ph.D. | Abstract Number: 20

Honorable Mention: 3 awards: \$250 each

Suzannah Chatlos, Cassandra Berbary, Latitia Lattanzio

Teachers' Perceptions and Knowledge of the Bullying Experiences of LGBTQ Students
Counseling, Psychology, and Special Education | School of Education
Faculty Advisor: Laura Crothers, D.Ed., NCSP | Abstract Number: 10

Jackie Shane, David Lampe, Lianna Pau

A search for blood-induced promoters in *Asaia* sp. SF2.1 a midgut symbiont of the *Anopheles* vector
Biology | Bayer School of Natural and Environmental Sciences
Faculty Advisor: David Lampe, Ph.D. | Abstract Number: 55

Lu Liu

Pain Nanomedicine: COX-2 Targeted Theranostic Nanoemulsions Redesigned
Pharmaceutics | Mylan School of Pharmacy
Faculty Advisor: Jelena Janjic, Ph.D. | Abstract Number: 60

Office of the Provost

Provost's Award for Outstanding Scholarship: \$250

Nicole Hill, Molly Dienno, Katherine Romanyshyn, Carly Sommer, Susan Caspari

Early Speech Sound Development in Children with Childhood Apraxia of Speech and Other Speech Sound Disorders
Speech-Language Pathology | Rangos School of Health Sciences
Faculty Advisor: Megan Overby, Ph. D., CCC-SLP | Abstract Number: 19

Honorable Mention: 2 awards: \$125 each

Besem Etchi

From the Cross to Holy Orders: Chauvet's Symbolic Theology and the Sacramental Implication of Women's Presence on Mt Golgotha in Jn. 19:25-28
Theology | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor: Marie Baird, Ph.D. | Abstract Number: 71

Thomas Wright, Christopher Raybuck, Katheryn Wendekier, and Jordan Waddell
Simultaneous Inhibition of the PI3K/Akt and MEK5/ERK5 Cascades Reduce Proliferation and
Migration in Hormonally Diverse Breast Cancer Cell Lines
Pharmacology | Mylan School of Pharmacy
Faculty Advisor: Jane Cavanaugh, Ph.D. | Abstract Number: 6

ORAL PRESENTERS' PAPERS

Students who are selected to orally present at the GSRS are given the opportunity to submit a full paper to the Office of Research for the Proceedings. Some presenters have chosen not to include a paper due to the possibility of publishing.

NAME	Title
<p>Etchi Besem McAnulty College and Graduate School of Liberal Arts – Theology Faculty Advisor: Marie Baird, Ph.D. Abstract Number: 71</p>	<p>From the Cross to Holy Orders: Chauvet’s Symbolic Theology and the Sacramental Implication of Women’s Presence on Mt Golgotha in Jn. 19:25-28 PAGE 12</p>
<p>Daniel Hurst McAnulty College & Graduate School of Liberal Arts – Center for Healthcare Ethics Faculty Advisor: Henk ten Have, Ph.D. Abstract Number: 73</p>	<p>“Right to Try” Legislation: A Complicated Ethical Matter PAGE 31</p>
<p>Clement Kanu McAnulty College & Graduate School of Liberal Arts – English Faculty Advisor: Marie Baird, Ph.D. Abstract Number: 74</p>	<p>Embodied Narrative and the Formation of Virtue: Communitarian-Anamnetic Framework in Traditional African Ethic PAGE 40</p>
<p>Cebrail Karayigit School of Education - Counselor Education & Supervision Faculty Advisor: David L. Delmonico, Ph.D. Abstract Number: 75</p>	<p>The Effectiveness of Homework Assignments in Cognitive Behavioral Therapy for Public Speaking Anxiety: A Case Study PAGE 54</p>
<p>Benjamin Meyer Mary Pappert School of Music – Guitar Faculty Advisor: Zvonimir Nagy, Ph.D. Abstract Number: 63</p>	<p>Numbers and Proportion in Performing Arts: An Exploration of Musical Space in Stravinsky’s Agon PAGE 66</p>
<p>Steven Perry McAnulty College & Graduate School of Liberal Arts - Theology Faculty Advisor: Sebastian Madathummuriyil, Ph.D. Abstract Number: 64</p>	<p>Evangelicals at the Climate Change Crossroads PAGE 77</p>
<p>Jordan Potter McAnulty College and Graduate School of Liberal Arts – Center for Healthcare Ethics Center for Healthcare Ethics Faculty Advisor: Gerard Magill, Ph.D. Abstract Number: 65</p>	<p>An Ethical and Practical Analysis of the Benefits Associated with Compensated Live Organ Donation PAGE 87</p>
<p>Lois Schertz School of Nursing Faculty Advisor: Mary Loughron, Ph.D. Abstract Number: 79</p>	<p>Evaluation of Liposomal Bupivacaine in Total Knee Arthroplasty PAGE 97</p>
<p>Thomas Wright, Christopher Raybuck and Katheryn Wendekier Mylan School of Pharmacy Faculty Advisor: Jane Cavanaugh, Ph.D. Abstract Number: 66 Simultaneous Inhibition of the PI3K/Akt and MEK5/ERK5 Cascades</p>	<p>Reduce Proliferation and Migration in Hormonally Diverse Breast Cancer Cell Lines PAGE 105</p>

**From the Cross to Holy Orders: Chauvet's Symbolic Theology and the Sacramental Implication of
Women's Presence on Mt Golgotha in Jn. 19:25-28**

Besem Etchi

The gospel according to John opens in a chiastically arranged cosmic hymn (Jn 1:1-18) centered on humans receiving power and becoming children-of-God such that, they are born of God (see Jn 1:13). With key texts unique to this gospel, the writer achieves this project by first, Mary is made our mother (see Jn 19:22-28) and second, God is made our Father (see Jn 20:17), alike unto Jesus Christ, inviting us to discipleship. This first step interests our inquiry.

Similarly, Catholic catechesis instructs that covenantal children of God emerge from the 7 sacraments instituted by Jesus Christ. The historical development of sacraments, show attempts to explain and assert them via theological supports and philosophical structures. 16th C Scholastic theology, derived from Thomas Aquinas used metaphysics to structure sacraments, providing the most excellent way for the Church to explain the realities contained in and communicated by the sacraments. However, in today's 20th Century, Louis Marie Chauvet criticizes scholastic onto-theology (with its categories of being, instrument and production) as too narrow to effect ethics from sacraments. In addition, Chauvet finds the categories erroneous, first, for the claim of certainty on divine nature and action, and second in setting up grace in a market economy rather than a symbolic exchange. Chauvet's categories of language, symbol and presence, depict sacraments as ritual expressions of the Word and as the *"symbolic place of the ongoing transition between scripture and ethics, from the letter to the body."*¹

This paper uses womanist hermeneutics² of retrieval and rereading on Jn 19:25-28 employing Chauvet's sacramental theology. To begin, it discusses Chauvet's dialectic of sacraments as: instituted to

¹ Louis-Marie Chauvet, *Symbol and Sacrament: A Sacramental re-interpretation of Christian Existence*, (Collegeville: The Liturgical Press, 1995), 265.

² Delores Williams summarizes the elements of a womanist hermeneutic for effectiveness as having 1) a multi-dialogical intent, 2) a liturgical intent, 3) a didactic intent, and a commitment both to reason and to

institute Christian identity; and outlines the Catholic concept of Holy Orders. It then turns to Jn 19:26-27 where women ascend to the top of Mt Golgotha, to examine Jesus' last words on the cross, to mother and disciple, to identify a ritual act. Precisely, Jesus's double-adoption formula: "*woman, behold thy son...son behold thy mother*" propels our investigation into whether there be a "*major symbolic proclamation of the identity of the Christian group.*"³ After selectively surveying literary, narrative, canonical and theological exegetical conclusions, this paper traces the effects of both formula and reception to claim the institution of a sacrament. The core contribution is a woman's body as the operating symbol of Christ's salvific gift; and the resulting effect on the Church as the disciple's assimilation into the body of Christ, which symbolically transforms the disciple into a child of God. This paper argues that Christ's ritual act of Jn 19:25-28 completes the dispensation for ecclesial identity through the symbolic icon of Mary's female body. It offers a compelling systematic basis to resolve the conundrum of women and Holy Orders, steeped in Catholic Tradition.

Chauvet's Concept of the Symbolic Mediation of Sacraments: Instituted-For-Instituting

Chauvet's conviction of the "sacramentality of the Christian faith" is the "*necessity for the Christian faith to be inscribed in corporeality*" which evokes for him, a symbolic order of a socio-linguistic medium that constitutes an ecclesial body.⁴ His postmodern project focuses on rethinking sacraments as obeying the "*laws of the symbolic order and seen from the point of view of a theology of the cross*" such that the emphasis of sacramental engagement is on presence, corporeality, language, and symbolic

the validity of female imagery and metaphorical language in the construction of theological statements. Delores S. Williams, 1987, "Womanist theology: Black women's voices," in *Christianity and Crisis* 47, no. 3: 66-70. ATLA Religion Database with ATLASerials, EBSCOhost (accessed August 7, 2015).

³ Chauvet, *Symbol and Sacrament*, 342.

⁴ Glenn Ambrose succinctly summarizes the core of Chauvet's theology related to overcoming onto-theology based on Heidegger's philosophical critique. Glenn Ambrose, *The Theology of Marie Chauvet: Overcoming Onto-theology with the Sacramental tradition* (Burlington, VT: Ashgate publishing Company, 2012)3.

mediation.⁵ In Chauvet's sacramental framework of symbolic mediation, a sacrament is instituted by Jesus Christ⁶, who is once God and human, for instituting Christian faith and identity.⁷ Thus, Chauvet situates sacraments in the realm, not simply of Christian functioning but of Christian identity; nor of mere concepts but of creating a kind of person. Chauvet offers to sacraments grounding principles of 1) sacraments as "ritual acts which it [the Church] receives as instituted by Jesus Christ"⁸ 2) language as "indeed the most powerful mediation in instituting subjects,"⁹ 3) "God is their auctor, their creative and operating agent,"¹⁰ and 4) the origin of sacraments as: "ran down the side of Christ crucified."¹¹ Chauvet's starting point for Christic institution is the Paschal mystery of Jesus Christ and this diverges

⁵ Ambrose, *The Theology of Marie Chauvet*, 3.

⁶ Did Jesus perform Juridical acts at particular points or did he institute the church to institute the sacraments as ecclesial acts working by the Spirit? Herbert Vorgrimler, drawing on Karl Rahner's understanding, argues that juridical pinpoints of inauguration are a modern articulation that cannot be justified. Furthermore that both Scholasticism and the Council of Trent, conceive of *institution* as "embedded the sacraments in a context going back far beyond Jesus Christ, to the very beginning of creation." He sees the individual sacraments as further developments and the effective fulfillment of the primordial sacrament of Jesus, the Church by the Spirit. Herbert, Vorgrimler, *Sacramental Theology*, Trans. by Linda M. Malone, (Collegeville, Minnesota: The Liturgical Press, 1992) 73-74. Edward Schillebeeckx argues similarly that the church is Christ's visible earthly symbol of grace, which "as foundational sacrament is the fundamental institution of the seven sacraments of Christ". Edward Schillebeeckx, *Christ the Sacrament of the Encounter with God* (New York: Sheed and Ward, 1963) pp. 112-32. Ultimately their arguments center on giving the church a fundamental role in the originating and perpetrating of sacraments which is at risk of blurring the difference between Jesus and the church. My take is that the sacraments come before the church and create the Church, which in turn, reshapes and perpetrates the Sacraments. For example, the exorcism done by Jesus and his calling of each disciple testify to healing and belonging graces. In addition, the response of Jesus to the 70 sent on mission (Lk 10:17-19) testify to their acting in power before his death and resurrection. Peter Phan on Asian theologie, does a good job differentiating Jesus and the Church. Peter Phan, *Being Religious Interreligiously: Asian Perspectives on Interfaith Dialogue* (New York: Orbis Books, 2004) 92-95. This difference can be blurred by say Schillebeeckx's "church as "earthly 'body of the Lord,'" and his "glorified body" without stressing as well that it is his "spiritual body on earth" as constituted by his use of sacramental grace to incorporate us into himself, thus transforming us into the Johannine theme of the children of God, who of course make up the kingdom of God.

⁷ Chauvet, *Symbol and Sacrament*, 377-446.

⁸ Chauvet, *Symbol and Sacrament*, 378.

⁹ Chauvet, *Symbol and Sacrament*, 377.

¹⁰ Chauvet, *Symbol and Sacrament*, 380.

¹¹ Ibid.

from the Scholastic starting point of the Incarnation (hypostatic union). These principles will inform our deliberation on Jn 19:25-28.

Chauvet's critique of an onto-theological grounding for sacraments criticizes Thomas Aquinas for privileging the mode of *cause* as the category for comprehending *grace* in the Sacramental relationship with the divine.¹² For Thomas Aquinas sacraments "produce", "cause", "confer", "work", "contain" and "add" grace in a productionist scheme, deriving this quality from Christ's passion.¹³ This made *grace* an object and assigned *grace* a value, furthermore introducing the production and instrument language typical of causality into the understanding of sacramental exchange between the divine and humans.¹⁴ It is to say there is a physical element in the liturgical rite that produces supernatural grace. Hence the discussion of sacraments becomes essentializing of certainty, matter, form and formula that reduces the sacrament to only a certain way of doing it. Chauvet depicts Thomas's inability to escape *causality* seen in his move from *disposing causality* of the sacraments to *instrumental causality* that still discusses sacraments in terms of efficiency than relationship as he says: "While in the *Summa*, a sacrament in general ... is a sign having this special character of causing what it signifies, in the *Sentences*, a sacrament is a cause ... having this special character ... of signifying what it causes."¹⁵ Chauvet attributes this to the underlying scheme of metaphysics which is *being*, to the disparaging of *becoming* which ethics is.¹⁶

Chauvet builds on Martin Heidegger's critique of metaphysical onto-theology: a certainty about the essence of everything by attributing this to God; a transcendent *Being* that grounds all *being*, in a manner that purports to know God without encounter.¹⁷ In his words

¹² Chauvet, *Symbol and Sacrament*, 7.

¹³ Chauvet, *Symbol and Sacrament*, 21.

¹⁴ Ibid.

¹⁵ Chauvet, *Symbol and Sacrament*, 11.

¹⁶ Chauvet elaborates this *being* as a productionist and foundational paradigm which is inherently dualistic. Chauvet, *Symbol and Sacrament*, 23-30.

¹⁷ Chauvet, *Symbol and Sacrament*, 26-38.

*“As metaphysics, it is by its very essence excluded from the experience of Being; for it always represents beings only with an eye to that aspect of them that has already manifested itself as being. But metaphysics never pays attention to what has concealed itself in this very being insofar as it became unconcealed.”*¹⁸

The result of this onto-theo-logical construction on philosophy and the theology built on it, is the impossibility of *“thinking about being as something that is not itself a being, and it has misconstrued the nature of God, thereby obstructing our relationship with the divine.”*¹⁹ Chauvet calls on negative theology from Church fathers like Dionysius and Chrysostom to claim that it is impossible for any human concept to exhaust God; nor can any concept be a common denominator between the divine and humanity.²⁰ Hence, onto-theology can easily tend to idolatry beyond eliminating the possibility of encounter with the divine which is the whole purpose of Christ’s gift of the sacraments.

Chauvet further explains that metaphysics views *being* as objectified by *thought*, not *language* which it sees as merely a *“conventional method of a mental content which itself consists of images of exterior things.”*²¹ The problem is that language in sacraments becomes solely human, a unidirectional instrument and intermediary from being to us, to effect a determined grace, rather than in Heidegger’s words *“the meeting place where being and humankind mutually step forward towards each other.”*²² This scheme is summarized as a *“foundational way of thinking”* that eliminates the *“distance between discourse and reality”* that Chauvet sees as the very site of symbolic exchange between human and divine in *“a process of approach never fully achieved, thus a transition to be done again and again...”*²³ Chauvet’s alternative way is *language* as symbolic mediation by which he retrieves *language* as constitutive of the human person making corporality and historicity become valuable symbols of divine-

¹⁸ Martin Heidegger, “Introduction to ‘What is Metaphysics?’” in *Pathmarks*, ed. William McNeill (Cambridge: Cambridge University Press, 1998), p. 288.

¹⁹ Mark Wrathall, *Religion after Metaphysics* (Cambridge Press, 2003), 3.

²⁰ Chauvet, *Symbol and Sacrament*, 38.

²¹ Chauvet, *Symbol and Sacrament*, 30.

²² Chauvet, *Symbol and Sacrament*, 33.

²³ *Ibid*

human exchange and not a focus on a detached essence. Sebastian Madathummuriyil notes in this light that:

“in contrast to the instrumental understanding of language [of scholastic onto-theology], Chauvet develops a non-instrumental view, whereby language is understood as having the function of bringing something into presence, rather than being the expression or representation of that which is already there. In this way language is not an instrument but mediation, as it mediates the subject’s coming into presence and constitutes human experience by preceding it.”²⁴

The goal of the sacraments is thus symbolic encounter that institutes the Church – its emergence in number of members and actualization of discipleship. In addition, sacraments create and proclaim identity, hence require successive repetitions by occasion and consent. According to Chauvet, a sacramental act has to be re-enacted in celebration so as to continue proclaiming the Church’s identity which is its “*dependence on Christ*.”²⁵ What makes an action of Christ’s passion institutive of a sacrament? Chauvet agrees with the Scholastics that it is in Jesus’s “conferring it, promising it or transmitting it.”²⁶ Furthermore, it must somehow, be evidenced that it is the Trinity, who is the creating and operating agent in the act to conclude it properly as a sacrament.

Outlining the Concept of Holy Orders in the Catholic Church

The Catechism of the Catholic Church instructs that “*Holy Orders is the sacrament through which the mission entrusted by Christ to his apostles continues to be exercised in the Church until the end of time: thus it is **the sacrament of apostolic ministry***.”²⁷ The essential difference between the common ministry of the baptized and ordained ministerial in Holy Orders is explained as the latter being: “at the service of the common priesthood; **It is directed at the unfolding of the Baptismal grace of all**

²⁴ Sebastian Madathummuriyil, *Sacrament as Gift: A Pneumatological and Phenomenological Approach* (Leuven: Peeters, 2012), 48.

²⁵ Chauvet, *Symbol and Sacrament*, 381

²⁶ See Thomas Aquinas’s *Summa* concerning Jesus instituting Confirmation in q.72, a.1 ad 1.

²⁷ *Catechism of the Catholic Church*, http://www.vatican.va/archive/ccc_css/archive/catechism/p2s2c3a6.htm (Accessed June 2, 2015), §1536. Emphasis mine.

Christians. The ministerial priesthood is a means by which Christ unceasingly builds up and leads his Church.²⁸ It is a sacrament instituted by Jesus Christ to “*proclaim the Word of God and to restore communion with God by sacrifices and prayer*”²⁹ and especially to offer the “*Eucharistic sacrifice*.”³⁰ The rite of ordination continues the tradition of integrating men into the order of bishops, presbyters, or deacons as explained:

““Ordination” goes beyond a simple election, designation, delegation, or institution by the community, **for it confers a gift of the Holy Spirit that permits the exercise of a “sacred power”** (sacra potestas) ... **it is a setting apart and an investiture by Christ himself for his Church.** The laying on of hands by the bishop, with the consecratory prayer, constitutes the visible sign of this ordination.”³¹

Traditionally the Last Supper of Holy Thursday is held as the lieu of institution of Holy Orders. The catechetical texts above provide the essential character of Holy Orders and the service for which Jesus intends it, as sufficient elements to evaluate a ritual act as belonging to Holy Orders. We now demonstrate that in Jn 19:25-28, the Messiah institutes a ritual act which institutes ecclesial identity.

A Ritual Structure Of Encounter

Entertain narrative criticism and exegetical commentary on the Good Friday pericope of Jn 19:25-28³² classed under the crucifixion of Jesus. The geographical setting is the top of Mt Golgotha (Jn 19:17-18), the New Sinai, which is also the foot of the cross. The ascent of women up the mountain is peculiar to the site of the new covenant for being absent at Moses’s ascent with Aaron, his sons and the 70 elders, to consummate the giving of the Law (Ex. 24:1, 8-10). This added occurrence aligns with the perfect, not merely permissible, will of God as the closing verse 28 says “*after this, aware that everything was now finished*” pointing to the preceding action as a preordained one to be accomplished.

²⁸ Ibid, §1547.

²⁹ Ibid, §1540.

³⁰ Ibid, §1552.

³¹ Ibid, §1538. Emphasis is mine.

³² New American Bible Revised Edition

This fact, rather than a conjecture, is conveyed by use of the Greek *tetelestai* in perfect indicative tense of the verb in 3rd person singular.³³ St John Chrysostom comments on v. 28: “*That is, “that nothing was wanting to the Dispensation.” For He was everywhere desirous to show, that this Death was of a new kind.*”³⁴ In other words, had this act not been performed the dispensation would be wanting.

Establishing Jesus’s Act as a Ritual Event

A narrative structure based on the actions of Jesus Christ may be laid out as:

Jesus Christ selectively gazes at Mary, his Mother, and the disciple (v 26a)

Jesus Christ addresses Mary as “woman” and apportions to her a son (v.26b)

Jesus pronounces the “Mother, Behold your Son” formula

Jesus Christ speaks to disciple, endowing Mary’s motherhood on the disciple (v. 27a)

Jesus pronounces the “Behold your Mother” formula

Jesus Christ’s gift is received by disciple and Mary in acceptance of each other (v.27b).

What is the content of this motherhood/sonship gift that Jesus must make? Overall, this structure flows in the separation-transformation-integration format of a ritual wherein (1) Jesus’ gaze separates two bodies: Mary and the Disciple, from the rest at the foot of the cross (v.26); (2) the double-adoption formulas (v.26b and v.27a) work a mutual transformation of identity; and (3) a performed language act, not discursive response, of mutual reception, establishes Christian identity.³⁵ This pericope thus meets Chauvet’s requirements of a “*unique corporeal measure whose expression is ritual*”³⁶ worthy of investigation for a sacrament. We now investigate the nature of this event, its operating principle and its ecclesial mode.

The Import Of The Double-Adoption Formula

³³ Biblical variants run along the same interpretation of the completing action: NLT renders the verse as “his mission was now finished;” KJV as “all things were now accomplished;” and Douay-Rheims as “All things were now accomplished.”

³⁴

³⁵ Chauvet discusses the fundamental principle of religious rituality as it being a practical activity centered on behavioral rather than discursive theory. Ritual language unfolds the self-implication via an illocutionary modality of the language act, crystallized in the efficacy of sacramental formulas, thus calling attention to practice over content; what it works rather than what ideas it puts forward, in a do-what-you-want-to-say attitude. Chauvet, *Symbol and Sacrament*, 321-329.

³⁶ Chauvet, *Symbol and Sacrament*, 378.

The sacramental nature of the ritual is achieved through the Messiah's double adoption formula which invests sacred power on a female body to work out with the disciple's language act, the ecclesial identity as "*Children of God*". Spiritual Motherhood occurs phenomenally as the accomplishment of the revelation of the children of God (Rom 8:19), as a possibility. The divine child is revealed by the accession of faith as a "pure gift and givenness that dispels any understanding of revelation in terms of being."³⁷ A primary focus is the Messiah's appellation of his Mother as "*Woman*" with no corresponding appellation to the disciple. Bible exegete George Montague asserts that with Our Lady Mary as the "*central woman in the scene*" and Jesus disrupting "*the customary way for a man to address his mother,*" in using "*Woman,*" the "*address emphasizes more than ever the real spiritual relationship [distancing himself from his natural relationship] that is now established between Mary and the beloved disciple.*"³⁸ In addition, this address "*woman*" links Mary to Gen 3:15 (and Is 14:7) to suggest that in him, Jesus, Mary's offspring "*the earliest promise of salvation is now being fulfilled*" at Jesus' hour on Calvary.³⁹ Thus, the first recipient of the Word in its power is exclusive to a female body suited to the investiture of Spiritual Motherhood. It further connects to John 2, the wedding at Cana, that displays in *Ti emoi kai soi* a messianic mutual concern, and is the first lieu that birthed faith in the messiah, mentions the messiah's hour, ministrant (*diakonos*)obedience and service, ritual jars (*hydriai*, nominative feminine), water, wine and at the end a marriage is salvaged through Maternal authority. In 2 is full of symbols that set the *sitz im leben* as the synagogue, with the presence of levitical functions and is connected to symbols of the Eucharist and matrimony, purification and ushering into ministerial service of others, which all happen to be sacraments.

³⁷ Sebastian Madathummuriyil, *Sacrament as Gift*, 192.

³⁸ George T. Montague, *Our Father, Our Mother: Mary and the faces of God*, (Steubenville: Franciscan University Press, 1990), 116-117.

³⁹ George T. Montague, *Our Father, Our Mother*, 118.

“Son”⁴⁰ on the other hand is expansive. Its biblical use is as male child, child in general, descendant, kinship, Son of Man, Son of God, sons of the resurrection (Luke 20:36), used preeminently for the Messiah, for those who claim Yahweh as parent and deity- in worship and character, for a follower of another. Montague explains that in this pericope Jesus is the principal actor.⁴¹ It is the way by which the gospel writer accomplishes his messianic project: “But to those who did accept him he gave power to become children of God, to those who believe in his name” (Jn 1:12).⁴² Making Mary the disciple’s mother is the first step of the “*divine begetting of the children of God*” in the “*same theme of filiation.*”⁴³

Exegete Bernard le Frois explains this investiture of Spiritual motherhood as “*John’s semiotic procedure of developing an idea*” that creates place for Spiritual sonship as the way the messianic words of being “*born from above...of the Spirit*” (Jn 3:3-8) are accomplished hence enabling baptism and regeneration that emerge the Church⁴⁴ – an apostolic ministry. He Early patristic sacramental theology (Irenaeus, Hippolytus, Gregory of Nazanzus) spoke of baptism as placing the person in the womb of Mary to be born as part of the body of Christ by the Holy Spirit. Hence this investiture by Jesus is a giving of sacred power to a woman to regenerate the mystical body of Christ – an apostolic ministry. Montague concludes that “the divine begetting and Mary’s spiritual motherhood are the result of one

⁴⁰ The theme of “son” being able to stand in for all children, male and female in biblical language is central to Jesus being able to stand in for all of humanity in *atonement theology* and likewise the disciple whom Jesus loved, a son being able to stand in for the entire church. However an exegesis of this presently uncontested theme will distract from the goal of the paper and thus this theme will simply be employed subsequently as a fact.

⁴¹ George T. Montague, *Our Father, Our Mother*, 127.

⁴² George T. Montague, *Our Father, Our Mother*, 114-115.

⁴³ George T. Montague, *Our Father, Our Mother*, 119-120.

⁴⁴ Le Frois demonstrates that John 1:13 is related to Jn 19 :26 and leads up to it, as a discourse on the rebirth of the sons of God via Mary’s spiritual motherhood of all the faithful. Bernard J. Le Frois, 1951. “Spiritual motherhood of Mary in John 1:13.” *The Catholic Biblical Quarterly* 13, no. 4: 422-431. *ATLA Religion Database with ATLASerials, EBSCOhost* (accessed June 13, 2015), 430.

and the same saving act.”⁴⁵ At this juncture we may conclude that this ritual is directed at the unfolding of the baptismal grace of all Christians, pointing us to the Sacrament of Holy Orders. How is the efficacious nature of this ritual gift of Jesus Christ?

The Symbolic Efficacy of This Ritual Act

Christ’s institution of spiritual motherhood is reminiscent of the Son who does only what He sees the Father doing (Jn 5:19). Symbolic efficacy is couched in the efficacy of Mary’s conception and birthing of the Messiah in the Incarnation (Lk 1). This physical motherhood is transformed into a spiritual one which is constituted by Jesus’s language, as the sending of a woman to be “*mother*” to the Church in a pattern of apostolic mission. Spiritualizing, makes Mary’s motherhood transferable to other women for continuing the work of Divine filiation for the Church. It is Jesus’s gaze of perfect love on the mother and the disciple in v.26 as he hangs on the cross and the return of acceding to love, in the fiats of both, which unlocks the occurrence of Jesus’s *kenosis* that makes visible the appearance of the Children of God – the Church. The key to note is that an “ontological change” occurs on one end only: upon the female body from woman to mother. Another pertinent point that John Wesley notes, is that the disciple becomes a son of Mary in the way Jesus is son to Mary and in Jesus’s place.⁴⁶ This can only be made real by incorporation into the body of Christ; hence, the scene contains a gift, not only of Christ’s mother but Christ’s very self-communication to the disciple - thus, properly, a functionable sacrament. The disciple participates fully in the event in order to become that which was intended, another Jesus, Son of God, born from Mary, but in the Spirit. In line with Chauvet’s sacramental theology, successful religious ritual displays a new identity in practice, having being marked (scholasticism’s ontological change applies here) to represent, exhibit and proclaim institutional visibility.⁴⁷

⁴⁵ George T. Montague, *Our Father, Our Mother*, 120

⁴⁶ John Wesley, “John 19, Explanatory Notes on the Whole Bible by John Wesley [1754-65],” Bible Hub, 2014, Accessed 9/11/2015, <http://biblehub.com/commentaries/wes/john/19.htm>.

⁴⁷ Chauvet, *Symbol and Sacrament*, 353.

The Iconic Efficacy of Mary's Spiritual Motherhood : From Word to Holy Orders to Care

Drawing on Jean Luc Marion's notion of idol and icon, at the incarnation, it is the superabundance of divine presence in Mary's body that makes the presence of Jesus Christ in her womb, real; the nature of which lies within the conditions of the idol. In the incarnation Divine givenness, assumes maximum phenomenality in the consenting female body, exhibiting the saturated phenomenon of Christ's appearance. The Trinity enters into "an absolute epiphany though filtered through finitude."⁴⁸ Thus in our pericope, the phenomenon of the Incarnation that constituted Mary as Mother of God (*Theotokos*) is now "translated" such that spiritual motherhood constitutes the disciple who receives her into a child of God, as a constituted witness, rather than being constituted by the acquiesce of the disciple, hence it operates according to the figure of the icon.⁴⁹ Here, Rahner's *Realsymbol* that underlies his symbolic causality of sacraments from an ontological point of view allows the identification of Mary as intrinsic symbol which makes her spiritual motherhood transferable to other women.⁵⁰ This symbol of the female body, a finite being, experiences both "self-expression and self-realization" as a "dynamically self-mediating reality."⁵¹ The female body makes spiritual and symbolic motherhood present in service to the members of the Church as a command instituted by Christ. In its spiritual and symbolic motherhood to the disciple, it functions according to what Rahner

⁴⁸ Marion observes this of the revelatory figure of Jesus Christ, see Sebastian Madathummuriyil, *Sacrament as Gift*, 192.

⁴⁹ Building on the recapitulation theology of Irenaeus and subsequently Maximus the confessor, all of Scripture may be considered as a showing of the promised salvific Woman and Her Son of Gen 3:15. According to Marion what shows itself, gives itself, hence all of Scripture may likewise be a giving of Christic motherhood and sonship, captured in bits in Hagar-Ishmael (Gen 16:11); Sarah-Isaac (Gen 17:16); Rachel – Joseph (Gen 30:24); Jochebed-Moses (Ex 2:1-2); Zipporah –Gershom (Ex 4:32); Hatzleponi-Samson (Jdg 14:3); Hannah-Samuel (1 Sam 1:20); Elizabeth-John (Lk 1:57). This becomes a saturated phenomenon, giving itself fully beyond horizons of physical motherhood to spiritual motherhood for the people of God in the mother/son relationship Mary-Jesus.

⁵⁰ Madathummuriyil exposes Rahner's theology of symbols and concept of *Realsymbol* that underlies his symbolic causality of sacraments from an ontological point of view. Rahner categorizes symbolism as intrinsic and extrinsic. In the former, the medium is constitutive of the structure of the reality but accidental in the latter. Sebastian Madathummuriyil, *Sacrament as Gift*, 29-38.

⁵¹ Madathummuriyil, *Sacrament as Gift*, 32.

refers to as “*the self-realization of a being in the other, which is constitutive of its essence.*”⁵² In the realm of symbolic mediation, the same logic that justifies why, though we have the Messiah, we would have need for a succession of men in Holy Order, holds true for the necessity of the extension of Mary’s spiritual motherhood into a succession of women in Holy Orders. In discussing the iconicity of *epiclesis* and the “fecundity” of the sacrament, the Eucharistic liturgy is the lieu of mediation, of “actualizing Christ’s presence” as on Golgotha and bringing to bear on the faithful “Christ’s original action” hence also the lieu for a repetition of Jn 19:25-27 in its own Church rite.

Receiving the gift of Mary’s motherhood evoked a pre-reflective responsibility on the disciple to “*take her into his home.*” Acceptance made the symbol of “*mother*” function-able. Charles Barrett purports that the Greek word *idia* translated house and otherwise as “*to his own*” (Douay-Rheims Bible) is an “*illustration of this unity [of the church gathered by Jesus’ death],*” since by the declaration of v.28 of completion, this ritual act brought the church into being.⁵³ He references Raymond Brown that this text evokes “*the Old Testament themes of Lady Zion giving birth to a new people in the messianic age and of Eve and her offspring.*”⁵⁴ The ecclesial mode of the action becomes more evident. Thomas Brodie, says the pericope is

“*women’s concern for the dying Jesus and Jesus’ concern for those being left behind... Such is the core of the text – a picture of profound care, even in very difficult circumstances. This care though portrayed in specific people is not something which is either self-made or isolated. On the contrary, it has two self-surpassing dimensions: it comes down from God and it constitutes the church.*”⁵⁵

Brodie’s notes that it is just when Jesus’ “*very clothes have been taken away that the gospel introduces the scene of human concern*” with the inference then that “*human care flows from the divine*” hence a

⁵² Karl Rahner, “The Theology of the Symbol” in *Theological Investigations*, vol.4 (London: Darton, Longman and Todd, 1966), 234.

⁵³ Barrett, *The Gospel According to John*, 552.

⁵⁴ Ibid.

⁵⁵ Thomas L Brodie, *The Gospel According to John : A Literary and Theological Commentary* (Ney York:NY; Oxford University Press, 1993), 547.

“dependence on God”.⁵⁶ This literary support grounds Jesus’s act as instituting ecclesial identity, the rationale for a sacrament according to Chauvet. Chauvet explains that sacraments institute the Church because they are “*events of grace*” that “*effect the relation of communion-dependence... as a condition of freedom.*”⁵⁷ The freedom to receive Mary’s spiritual motherhood and respond in love or reject and not respond remains intact for both woman and church assembly.

The Church’s Reception of Mary’s Spiritual Motherhood

According to Le Frois, the exegetical evidence of John 3:3-5 reveals God the Spirit as the “*principal efficient cause of regeneration, water being His [sic] powerful and efficient instrument for that purpose.*”⁵⁸ Water brings about regeneration which it symbolizes, being “*fructified by the sole power of the almighty (will of God)...*” and is designated as the maternal womb of Gen 1, over which the Spirit hovered.⁵⁹ The early Church Fathers aligned the symbolism of the waters of baptism with the maternal womb of Mary wherein the same Holy Spirit is *auctor*, creative and operating principle in both for giving life to the sons of God.⁶⁰ To quote a few, St Leo writes “*...to everyone when he [sic] is reborn, the water of baptism is like the virgin’s womb; for the same Holy Spirit fills the font who filled the virgin...*”⁶¹ and again writes:

*“the origin which he took from the womb of the virgin, He placed in the font of baptism; He gave to the water, what He gave to the Mother, for the power of the Most High and the overshadowing of the Holy Spirit which made Mary to bring forth, the same produces the effect that the water bears anew to the believer.”*⁶²

⁵⁶ Brodie, *The Gospel According to John*, 548.

⁵⁷ Chauvet, *Symbol and Sacrament*, 409.

⁵⁸ Le Frois, Bernard J. 1952. “Spiritual motherhood of Mary in John 3:3-5,” 117.

⁵⁹ Le Frois, Bernard J. 1952. “Spiritual motherhood of Mary in John 3:3-5,” 118-119.

⁶⁰ Le Frois, Bernard J. 1952. “Spiritual motherhood of Mary in John 3:3-5,” 120-122. It is worth noting that this offers a variant perspective from Paul’s linking of Baptism to “dying with Jesus Christ” and being “buried into his death” as a link of baptism to the incarnation where candidates are placed into the amniotic fluid of the womb of Mary that surrounds and protects to then be birthed by her in the pouring out of the water.

⁶¹ *Sermo 4 in Nat.*, PL 54, 206.

⁶² *Sermo 5 in Nat.*, PL 54, 211.

The crux here, being that Jesus gave to Mary “*the power of regenerating all the members of his mystical body.*”⁶³ St Irenaeus in the 2nd Century, the proponent of Mary as recapitulating Eve, as Jesus recapitulates Adam speaks of “*regeneratio ex Virgine per fidem*”⁶⁴ and “*pura vulva, quae regenerat homines in Deum.*”⁶⁵ St Hippolytus in the 3rd C speaks of “*nova nativitas ex Spiritu Sancto et Virgine.*”⁶⁶ The 4th C Cappadocian Father St Gregory of Nazanzus held that we too share Christ’s birth,⁶⁷ which is the virgin-birth from Mary. Every subsequent child of Mary (Rev 12) would become a child of God, because the operating principle is the Holy Spirit and the power of the Father (Lk 1:25). These Johannine texts and the interpretation of the Fathers reinforce Jn 19: 25-27 as Jesus’s gift of Mary’s spiritual motherhood to regenerate the Church.

Mary’s Spiritual Motherhood and the Holy Mass

In contemporary times St John Paul II’s magisterial teaching on Mary and the Eucharist outlined in various documents, her role and function at the foot of the cross and how it relates to the Holy Mass. Msgr. Arthur Calkins. Calkins quotes Vatican II theology in *Sacrosanctum Concilium* and the *sensus fidei* as attesting to the inseparability of Mary with the Holy Mass being the place where Jesus’s “*sacrifice is being renewed on the altar*”⁶⁸ St John Paul II is cited as teaching Mary’s presence as that she “*...obtains mercy ...sharing in the messianic mission of her Son, and was called in a special way to bring close to people that love he had come to reveal*” (*Dives in Misericordia*, 30 November 1980, §9)⁶⁹ – A clerical intercessory function. Mary’s “*motherhood ...guides the faithful to the Eucharist*” (*Redemptoris Mater*,

⁶³ Le Frois, Bernard J. 1952. "Spiritual motherhood of Mary in John 3:3-5," 121.

⁶⁴ Adv. Haer. 4,33,4; PG 7, 1074; Harvey, II, 259.

⁶⁵ Op. cit., 4,33,11; PG 7, 1080; Harvey, IV, 52.

⁶⁶ De Antichr. 44; GCS, Achelis 28, 20; PG 10, 763.

⁶⁷ Orat. in Theoph. 38, 4; PG 36, 316 f.

⁶⁸ Calkins, Arthur Burton “Mary’s Presence in the Mass: The Teaching of Pope John Paul II” in *Antiphon: A Journal for Liturgical Renewal* Vol. 10, N° 2 2006.

⁶⁹ Calkins, *Mary’s Presence in the Mass*, 135-136. Emphasis mine.

26 March 1987, §44);⁷⁰ A clerical and celebrational function. Pertinently, “*the flesh of Christ in the Eucharist is sacramentally the flesh he assumed from the Virgin Mary.*” (Angelus address Feast of Corpus Christi, Seville, Spain 1993)⁷¹ – Hence a spiritual mother can rightly proclaim the words “This is my body, this is my blood” and several others.

The establishment of succession then, through election, can be traced in: (1) Jn 20:1-18’s Resurrection account with Mary Magdalene becoming the apostle of the resurrection, (2) Paul’s greetings of Rom 16 that testify to the diaconal role of Phoebe and (3) Paul’s mention of the prominent apostleship of Junia in Rom 16. Also, it testifies to its occurrence in varied orders. In the tradition of the church a further exploration of the Desert Mothers and several Abbesses portray acquiesce of the Church to spiritual motherhood. In addition, several Vatican codices attest to ordination rites that established spiritual motherhood.⁷² In particular, a Vatican manuscript, the *Codex Barberini* – The Vatican Library gr. 336 (AD 780) presents this ordination rite for a female deacon.

Conclusion

The analogous sacrament of service to the communion in the Trinity: Matrimony as a template for understanding Holy Orders in two instances. The Sacrament is established by two ministers, the spouses, who in mutual exchange of consent freely make a self-gift to each other. The donation of one spouse alone cannot effect the sacrament.⁷³ This offers a basis to state that there is no contradiction in two instances of freedom and consent establishing the sacrament of Holy Orders for men and for women but rather this is integral to its fullness. From Matrimony, emerges the children-of-God, born according to the flesh by the action of the creative Spirit as recounted in Genesis 1 and 2. From Female

⁷⁰ Calkins, *Mary's Presence in the Mass*, 138.

⁷¹ Calkins, *Mary's Presence in the Mass*, 139.

⁷² John Wijngaards, *The Ordained Women Deacons of the Church's First Millennium* (Norwich: Canterbury Press, 2011)

⁷³ Canon Law on Marriage defines it thus and declares null and void, semblances of marriage that exclude the freedom and the consent of the other partner.

Holy Orders emerges the children-of-God born according to water and the Spirit as recounted in the new dispensation of the gospel according to John. Furthermore, the economy of salvation in the Catholic Tradition teaches the Easter Triduum: Holy Thursday, Good Friday and Holy Saturday, as a continuous event not demarcated by space or time. Seen in this light both institutions of the male line and the female line in Holy Orders by Christ are accomplished on the same salvific day. Thus dichotomy is only apparent not real. Lastly from the stance of a recapitulation Christology to remedy the Fall of Adam and Eve who received each their own punishment and not one for the other; it was necessary that the Christ restore through both male and female lines to achieve the promise of salvation. The Church and her sacramental theologians need to pay more attention to John 19:25-28 as it recovers the full humanity of women but even more so, the full identity of the Church.

BIBLIOGRAPHY

BOOKS

- Barett, Charles Kingsley. *The Gospel According to John: An Introduction with Commentary and Notes on the Greek Text*. 2nd Ed. Philadelphia, PA: Westminster Press, 1978.
- Brodie, Thomas L. *The Gospel According to John: A Literary and Theological Commentary* (New York: NY; Oxford University Press, 1993).
- Catholic Church. *Catechism of the Catholic Church*: Revised in Accordance with the Official Latin Text Promulgated by Pope John Paul II. Vatican City: Libreria Editrice Vaticana, 1997.
- Chauvet, Louis-Marie. *Symbol and Sacrament: A Sacramental Reinterpretation of Christian Existence*. Translated by Patrick Madigan and Madeleine Beaumont. Collegeville, MN: The Liturgical Press, 1995.
- _____. *The Sacraments: The Word of God at the Mercy of the Body*. Collegeville, Minn: Liturgical Press, 2001.
- Freedman, David Noel, Allen C. Myers, and Astrid B. Beck. *Eerdmans Dictionary of the Bible*. Grand Rapids, Mich: W.B. Eerdmans, 2000.
- Gambero, Luigi. *Mary and the Fathers of the Church: The Blessed Virgin Mary in Patristic Thought*. San Francisco: Ignatius Press, 1999
- Gunkel, Hermann. *The Psalms: A Form-Critical Introduction*. Fortress Press, 1967.
- _____. Completed by Joachim Begrich. *Introduction to Psalms: The Genres of the Religious Lyric of Israel*. Mercer University Press, 1998.
- Heidegger, Martin "Introduction to 'What is Metaphysics?,'" in *Pathmarks*, ed. William McNeill. Cambridge: Cambridge University Press, 1998.
- Johnson, Luke Timothy. *The Gospel of Luke*. Sacra Pagina, ed. Daniel Harrington, no. 3. Collegeville: The Liturgical Press, 1991.
- Madathummuriyil, Sebastian. *Sacrament as Gift: A Pneumatological and Phenomenological Approach*. Leuven: Peters, 2012.
- Montague, George T. *Holy Spirit: Growth of a Biblical Tradition*. New York, Paulist Press, 1976.
- _____. *Our Father, Our Mother: Mary and the Faces of God*. Steubenville: Franciscan University Press, 1990.
- Schillebeeckx, Edward. *Christ the Sacrament of the Encounter with God*. New York: Sheed and Ward, 1963.
- Phan, Peter. *Being Religious Interreligiously: Asian Perspectives on Interfaith Dialogue*. Orbis Books. 2004
- Prétot, Patrick. "The Sacraments as 'Celebrations of the Church': Liturgy's impact on Sacramental theology." in Phillippe Bordeyne and Bruce T. Morill. *Sacraments: Revelation of the Humanity of God*. Collegeville: Liturgical Press: 2006.
- Vorgrimler, Herbert. *Sacramental Theology*, Trans. by Linda M. Malone. Collegeville, Minnesota: The Liturgical Press, 1992.
- Wijngaards, John *The Ordained Women Deacons of the Church's First Millennium*. Norwich: Canterbury Press, 2011.

ARTICLES

- Brian Loar, "Phenomenal States" in *The Nature of Consciousness*, eds N. Block, O. Flanagan, G. Güzeldere (Cambridge, MA: MIT Press, 1997), 597- 616.
- Calkins, Arthur Burton "Mary's Presence in the Mass: The Teaching of Pope John Paul II" in *Antiphon: A Journal for Liturgical Renewal* Vol. 10, N° 2 2006.

- Catholic Church, and John Paul II. Encyclical Letter, *Ecclesia De Eucharistia*, of His Holiness Pope John Paul II: To the Bishops, Priests and Deacons, Men and Women in the Consecrated Life and All the Lay Faithful on the Eucharist in Its Relationship to the Church. Washington, D.C.: United States Conference of Catholic Bishops, 2003
- Corrado Maggioni. Liturgical Commission, Mary, An Icon Of The Church That Baptizes In Jesus Christ in *TERTIUM MILLENNIUM* N.4/ September 1997. Accessed March 29, 2015.
http://www.vatican.va/jubilee_2000/magazine/documents/ju_mag_01091997_vol-iv-index_en.html
- Denysenko, Nicholas E. "The Soteriological Significance Of The Feast Of Mary's Birth." *Theological Studies* 68, no. 4 (December 2007): 739-760. Academic Search Elite, EBSCOhost (accessed March 28, 2015).
- _____. "Liturgical maximalism in Orthodoxy: a case study." *Worship* 87, no. 4 (July 1, 2013): 338-362. ATLA Religion Database with ATLASerials, EBSCOhost (accessed March 29, 2015).
- Le Frois Bernard J. "*Spiritual motherhood of Mary in John 1:13.*" *The Catholic Biblical Quarterly* 13, no. 4: 422-43.1951. ATLA Religion Database with ATLASerials, EBSCOhost (accessed June 13, 2015).
- Rahner, Karl. "The Theology of the Symbol" in *Theological Investigations*. vol.4. London: Darton, Longman and Todd, 1966.
- Vatican Council. *Dogmatic Constitution on the Church: Lumen Gentium*, Solemnly Promulgated by His Holiness, Pope Paul VI on November 21, 1964. Boston: St. Paul Editions, 1965
- Williams, Delores S. "Womanist theology: Black women's voices." *Christianity And Crisis* 47, no. 3 (March 2, 1987): 66-70. ATLA Religion Database with ATLASerials, EBSCOhost (accessed August 7, 2015).
- Wrathall Mark, *Religion after Metaphysics* (Cambridge Press, 2003)

Electronic Resources

- Augustine, Tractate 119(Jn 19:24-30), in Tractates on the Gospel of *John*. Translated by John Gibb. *From Nicene and Post-Nicene Fathers*, First Series, Vol. 7. Edited by Philip Schaff. Buffalo, NY: Christian Literature Publishing Co., 1888. Revised and edited for New Advent by Kevin Knight.
www.newadvent.org/fathers/1701119.htm Accessed 10 September 2015.
- Wesley, John. "*John 19, Explanatory Notes on the Whole Bible by John Wesley* [1754-65]." Bible Hub, 2014. Accessed 9 September 2015. <http://biblehub.com/commentaries/wes/john/19.htm>.

“Right to Try” Legislation: A Complicated Ethical Matter

By: Daniel Hurst

The 2013 movie *Dallas Buyers Club* is loosely based on the basic premise of “right to try” legislation. In the film, which is based on actual events, the character Ron, portrayed by Matthew McConaughey, is diagnosed with AIDS and given only 30 days to live. As he talks with his doctor about his diagnosis, she tells him that the FDA is currently testing AZT on humans in clinical trials. Through a series of events, McConaughey’s character bribes a hospital worker to get him the AZT, which he then takes and becomes more ill. After visiting a doctor in a Mexican hospital, the physician prescribes him a different drug that is not yet approved in the U.S. His health improves on this drug and he realizes that he could make money by importing the drugs and selling them to other HIV-positive patients in the U.S.

Throughout the movie, the priority of McConaughey’s character is provision of the drugs for himself and others who need them. This is complicated when Peptide T becomes increasingly difficult to acquire. So in 1987 he files a lawsuit against the FDA seeking the legal right to take the protein, which has been confirmed as non-toxic for humans, but is still unapproved. The judge is seen as compassionate toward McConaughey’s character and even goes so far as admonishing the FDA, but lacks the legal recourse to do anything. As the film ends, on-screen text reveals that the FDA later allowed McConaughey’s character to take Peptide T for personal use, and his character died of AIDS in 1992, seven years later than the 30 days prognosis his doctors initially predicted.

New medical therapies for disease and illness are constantly in the pipeline of development both domestically and abroad. The past two decades has seen an explosion of new therapies with more certainly on the horizon. However, the process for getting a new therapy through the clinical trial phase progression, federal approval, and to the marketplace is drawn-out and can take several

years from time of discovery. Due to this lengthy process, there has been a tradition within the area of pharmaceutical development whereby patients with advanced illness, and commonly a terminal prognosis, may be given access to novel but as yet unproven therapies. However, recently, certain advocacy groups have pursued legislative approval for access to such experimental therapies, claiming that patients have a constitutional right to such therapies.ⁱ Often dubbed either a “right to try” or “compassionate use”, these laws claim to seek expanded access to unapproved drugs, and the system of expanded access has become increasingly controversial. Pharmaceutical developers have no legal or regulatory obligation to deliver access to unapproved therapies on the grounds of compassionate use. Nonetheless, some do, and this process raises a number of ethical challenges to be considered. The chief argument in favor of expanded access is that patients who have exhausted all standard therapies should have a right to assuage intense suffering and to enhance self-preservation, such as the case in *Dallas Buyers Club*. Yet, at early stages in the development of a therapy, efficacy and safety may be uncertain. The risks of such therapy may indeed outweigh the benefits.

This analysis will discuss this issue of “right to try”, as well as ethical concerns surrounding early access to experimental therapies. The potential consequences of expanded access will be articulated within a bioethical framework. The analysis will proceed by first examining a brief history of expanded access in the U.S., will then look at the rise of “right to try” legislation, and, finally, analyze the ethical challenges surrounding the issue.

In 1938, Congress mandated that the Food and Drug Administration (FDA) provide extensive evidence that newly created drug products are both safe and effective prior to receiving approval and coming to the public market.ⁱⁱ The 1962 Drug Amendments and the 1963 investigational drug regulations followed this up and decided that safety and effectiveness would be determined through new stages of controlled clinical trials, of which there are now three prior to approval of a new drug or device, as well as a fourth after approval to continue collecting dataⁱⁱⁱ:

- Phase I: Researchers test a new drug or therapy in a small group of people (20-80) for the first time to evaluate its safety, determine a safe dosage range, and identify side effects.
- Phase II: The drug or treatment is given to a larger group of people (up to 300) to evaluate its effectiveness and further study its safety.
- Phase III: The drug or treatment is given to large groups of people (several hundred to about 3,000) to confirm its effectiveness, monitor side effects, compare it to commonly used treatments, and collect information that will allow the drug or treatment to be used safely.
- Phase IV: Studies are done following the marketing of a drug or therapy to collect data on its effect in various populations and any side effects associated with prolonged use.^{iv,v}

Once this system of validating safety and efficacy based on controlled clinical trials was implemented, the average timeline for development of a new pharmaceutical rose from a relatively short 2.5 years to now an average of 8-12.^{vi,vii} As a way of seeking to mitigate the repercussions from such extended delays of a potentially life-saving drug, the FDA permitted either a patient or physician to petition to receive access to unapproved drugs. Hence, expanded access to unapproved pharmaceuticals has a lengthy history in the U.S. These new pathways were established in 1987 due to the AIDS crisis and then were overhauled in 2009. For every expanded access request, the FDA must determine that the patient's condition is serious or life-threatening, that there exists no similar alternative therapies, and that provision of the drug or device will not impede time-sensitive and crucial clinical trials.^{viii}

"Right to try" laws are based on a February 2014 model law drafted by the libertarian leaning Goldwater Institute of Phoenix, Arizona.^{ix} These laws introduce legislation stating that patients with a disease progressing towards death have a right to access investigational drugs or devices that have completed phase I clinical trials. The governor of Colorado signed the nation's first "right to try" legislation into law in May 2014. Fourteen states in total have now set "right to try" legislation into law, with numerous others considering similar statutes.^x The laws permit

pharmaceutical manufacturers to provide unapproved drugs and devices to terminally ill patients without FDA authorization, which, in the eyes of advocates, eliminates certain obstacles to expanded access.^{xi}

For the ethical analysis of the issue of “right to try”, a normative framework drawn from Western bioethics will be employed using the principles of respect for autonomy, beneficence, and justice. The primary ethical argument for a “right to try” is that patients, especially those patients with a life-threatening condition and dire prognosis, should have a right to alleviate their suffering and perhaps even enhance self-preservation. Within a philosophical or bioethical framework, this is a rationale clearly grounded in the normative principle of respect for autonomy. The principle of respect for autonomy entails acknowledging a person’s right to hold views, make choices, and take actions based on their values and beliefs.^{xii} Advocates of expanded access hold that, as rational actors, they are capable of making informed, thoughtful treatment decisions when in consultation with their physician.^{xiii} Further, supporters argue that they are in the best possible spot to gauge the risks and benefits of experimental therapy, not the government or a researcher.

The principle of respect for individual autonomy is a huge actor in this debate. Advocates cite that by restricting drug testing policies then the government is improperly interfering with a person’s freedom to accept possible harm from exposure to investigational drugs. This is clear in Colorado’s “Right to Try Act” enacted in 2014, the first in the country:

§25-45-102 (1) (c). PATIENTS WHO HAVE A TERMINAL ILLNESS HAVE A FUNDAMENTAL RIGHT TO ATTEMPT TO PURSUE THE PRESERVATION OF THEIR OWN LIVES BY ACCESSING AVAILABLE INVESTIGATIONAL DRUGS, BIOLOGICAL PRODUCTS, AND DEVICES.

§25-45-106. AN OFFICIAL, EMPLOYEE, OR AGENT OF THIS STATE SHALL NOT BLOCK OR ATTEMPT TO BLOCK AN ELIGIBLE PATIENT'S ACCESS TO AN INVESTIGATIONAL DRUG, BIOLOGICAL PRODUCT, OR DEVICE.^{xiv}

Hence, Colorado and similar states have clearly appealed to a person’s fundamental right to self-govern their own medical care and the value of free choice.

Advocates for a “right to try” have similarly appealed to the ethical principle of beneficence, which in the bioethics realm, refers to a moral obligation to act for the benefit of others.^{xv} Those proponents of a “right to try” stress the benefits a patient could gain by either participating in a clinical trial or receiving an investigational drug outside a clinical trial. Advocates argued that, in light of their dire situation, the experimental drugs offered patients a chance of benefit and presented risk that was insignificant when their dire illness is taken into account.^{xvi}

Lastly, the principle of justice has been invoked in this conversation. The principle of justice dictates that the benefits and burdens of medical research should be fairly distributed among all populations.^{xvii} From a historical standpoint, the modern-day restrictive approaches to clinical trials are a reaction to a past of research abuses in which scientists placed an inordinate research burden upon historically disadvantaged groups, such as the critically ill. However, protecting such disadvantaged groups from an unfair share of the burdens of research, such as the very sick, also kept them out of clinical trials that could extend their lives, advocates argue.^{xviii}

These positions are juxtaposed by those who seek to curtail access to unapproved drugs and argue that the odds of an experimental, and largely untested drug, working in many expanded access settings are very marginal. Clinically meaningful benefit from a drug in early-stage or phase 1 studies may be less than 10%.^{xix} In such circumstances, benefit-risk assessment cannot be calculated because quantitative data has not been collected.^{xx} Skeptics of expanded access have even cautioned that the risks associated with potentially harmful experimental drugs that have the possibility of aggravating suffering and hastening death in itself justifies greater paternalistic practices and policies for patients with life-threatening conditions.^{xxi}

Many physicians and bioethics commentators largely agree with the opinion that those patients with a life-threatening illness who have exhausted all other treatment avenues should have recourse to experimental therapies. Prominent bioethicist Art Caplan of NYU has stated, “[M]orally, we owe it to desperately ill and dying people to try interventions that might help them, certainly

when there are experimental drugs and vaccines that we have enough information about to know they might help.”^{xxii} Yet, Caplan also rejects the manner in which legislators have attempted to shape this issue into a constitutional right.^{xxiii} While we may largely agree that there should be mechanisms for allowing such patients access to unapproved drugs or therapies, a crucial question is, “Are advocacy groups going about it in the correct way?” That is, should this position truly be framed as a constitutional right?

Certainly from an ethics standpoint there is much to be praised about the worth of compassionate use or expanded access, though framing such an issue as a constitutional right may be misguided. To begin, are an individual state’s “right to try” laws actually going to accomplish anything? Despite the attention they have garnered, it is unlikely that “right to try” laws will grant patients more access to unapproved drugs or therapies. The FDA is unlikely to ignore unauthorized use of unapproved drugs, especially in light of the fact that the agency currently already provides physicians and patients with a regulatory pathway for compassionate use. Further, right to try laws do not place any legal burden upon pharmaceutical manufacturers to actually provide the unapproved drug or device. That is, these laws do not place an onus upon manufacturers to actually do anything.^{xxiv} Manufacturers may rightfully worry that providing access to drugs or devices outside of clinical trials could deplete their limited supplies of experimental products, make them liable for injuries, and make future FDA approval less likely, either because of adverse events that develop in the patients or by deterring patients from enrolling in the clinical trials needed for approval.^{xxv}

Similar to existing federal regulations, the state laws allow pharmaceutical companies to charge patients for unapproved products but they do not compel companies to provide access. The Pharmaceutical Research and Manufacturers Association, the trade group of U.S. pharmaceutical companies, has expressed reservations, noting that “right to try” laws are unlikely to speed safe and effective new treatments to terminally ill patients.^{xxvi}

In conclusion, while morally we may owe it to desperately ill and dying people to try interventions that might help them when there are experimental drugs available that we know might help, attempting to shape such an issue into a constitutional right may be misguided. While we may largely agree that there should be mechanisms for allowing such patients access to unapproved drugs or therapies, “right to try” laws mean nothing for terminally ill patients unless a pharmaceutical company cooperates. Even if a company does cooperate, “right to try” laws add little if anything to the existing regulatory pathways for early access to experimental medications. And, of course, we must be cognizant that receiving an experimental product is not akin to being aided by it. A drug that has completed phase 1 FDA trials has limited evidence of safety and no evidence of efficacy. Hence, these laws are unlikely to actually help patients with critical, life-threatening illnesses. “Right to try” laws may even prove damaging if they draw attention and resources away from efforts to develop effective treatments, produce misunderstanding about the existing FDA pathway for compassionate use of drugs and devices, or create false hopes for terminally ill patients.^{xxvii}

It has frequently been recognized by this nation’s courts that the best route to extensive access to unproven drugs and therapies is through demonstrating their safety and efficacy in a prompt manner in order to gain the FDA stamp of approval. Widespread expanded access may be best achieved through a straightforward process of shortening the time between drug discovery and the point at which it is available to the marketplace.^{xxviii}

Bibliography

Barone, Michael. "The Success of Right to Try Laws Signals a Major Shift." *New York Post*, October 6, 2015. <http://nypost.com/2015/10/06/the-success-of-right-to-try-laws-signals-a-major-policy-shift/>

Beauchamp, Tom L. and James F. Childress. *Principles of Biomedical Ethics*. 7th ed. New York: Oxford University Press, 2013.

Chedekel, Lisa. "Debating the Ethics of Experimental Drugs." *BU Today*. March 18, 2015. <http://www.bu.edu/today/2015/ethics-of-experimental-drugs/>

Colorado State Legislature. House Bill 14-1281. "Article 45: Access to Treatments for Terminally Ill Patients." http://www.statebillinfo.com/bills/bills/14/1281_enr.pdf

Curtin, François and Pierre Schulz. "Assessing the Benefit:Risk Ratio of a Drug—Randomized and Naturalistic Evidence." *Dialogues in Clinical Neuroscience* 13.2 (2011): 183-90.

Darrow, Jonathan J. Ameet Sarpatwari, Jerry Avorn, and Aaron S. Kesselheim. "Practical, Legal, and Ethical Issues in Expanded Access to Investigational Drugs." *The New England Journal of Medicine* 372.3 (2015): 279-86.

Dresser, Rebecca. "The Role of Patient Advocates and Public Representatives in Research." In *The Oxford Textbook of Clinical Research Ethics*. Edited by Ezekiel J. Emanuel, Christine A. Grady, Robert A. Crouch, Reidar K. Lie, Franklin G. Miller, and David Wendler. 231-41. Oxford: Oxford University Press, 2008.

Food and Drug Administration. "FDA's Drug Review Process: Continued." <http://www.fda.gov/Drugs/ResourcesForYou/Consumers/ucm289601.htm>

Heilman, RD. "Drug Development History, "Overview," and What are GCPs?" *Quality Assurance* 4.1 (1995): 75-79.

Junod, Suzanne White. "FDA and Clinical Drug Trials: A Short History." http://www.fda.gov/AboutFDA/WhatWeDo/History/Overviews/ucm304485.htm#_ednref52

Kearns, Lisa and Arthur L. Caplan. "'Right To Try' Law Won't Grant Access To Unapproved Drugs." *Hartford Courant*. April 6, 2015.

Meadows, Michelle. "Promoting Safe and Effective Drug Use for 100 Years." *FDA Consumer Magazine*. <http://www.fda.gov/AboutFDA/WhatWeDo/History/CentennialofFDA/CentennialEditionofFDACoNsumer/ucm093787.htm>

Rusthoven, James J. "Ethical Issues Raised by Compassionate Access to Experimental Therapies." *Ethics & Medicine* 30.1 (2014): 17-33.

U.S. Department of Health and Human Services. "The Belmont Report." April 18, 1979, <http://www.hhs.gov/ohrp/humansubjects/guidance/belmont.html>

U.S. National Library of Medicine. "Clinical Trial Phases." <https://www.nlm.nih.gov/services/ctphases.html>

Zettler, Patricia J. and Henry T. Greely. "The Strange Allure of State "Right-to-Try" Laws." *JAMA Internal Medicine* 174.12 (2014): 1885-86.

Embodied Narrative and the Formation of Virtue: Communitarian-Anamnestic Framework in Traditional African Ethic

Clement Kanu

Introduction

That there is a rupture in the global moral fiber hardly requires any rigorous explanation. While the media is rife with reports of violence,⁷⁴ and the internet is saturated with cyber crimes, the evils experienced in historical events such as the slave trade, genocides, lynching, among others, continue to stare us at the face not only as instances of human's inhumanity to fellow humans, but also as a demonstration of a distorted moral consciousness.

Contemporary Africa is not exempt from the above global ethical meltdown. In fact, "Churches and coffins", observes Emmanuel Katongole, "are the two most prevalent images associated with Africa today".⁷⁵ The veracity of this observation is not difficult to ascertain. Africa is an overwhelmingly religious continent contributing a lion share to the 66 per cent of the world's 1.1 billion Catholics that live in the southern hemisphere, and one-third of the world's Muslim population, yet social unrests as obvious for instance in the reports of xenophobia in South Africa, the Garissa university attack in Kenya, and the activities of *Boko Haram* (that now calls itself Islamic State West African Province [ISWAP]) in northern Nigeria and surrounding countries, are but recent examples. While

⁷⁴ In the United States for instance, more than 30,000 people lost their lives to gun violence in 2010, equivalent of 85 deaths each day and more than three deaths each hour. Cf. smartgunlaws.org/.../gun.../gun-vio. Accessed, October 27, 2015. The National Institute of Justice also reports that 467, 321 people fell victims to non-fatal firearm violence in 2011 alone. Cf. www.nij.gov/.../gun-violence/.../welcome.asp. Accessed October 27, 2015. In Syria, the death toll (due to the ongoing conflict) as at October 2015 is estimated at over 250,00, cf. www.iamsyria.org/daily-death-toll.html. Accessed November 20, 2015.

⁷⁵ Emmanuel Katongole, *The Sacrifice of Africa: A Political Theology For Africa* (Grand Rapids: William B. Eerdmans, 2011), 29

this glaring contradiction challenges the model of ecclesiology in Africa as Katongole rightly points out, it also questions the effectiveness of ecclesial categories in the formation of virtue.

Beyond ecclesiological implications however, this paper is particularly interested in the fact that this form of violence touches at the core of the virtues that characterize the African value system centered on the “mystique of life”⁷⁶ and structured on hospitality, a deep sense of shared reciprocal humanness, love of neighbor, and a profound appreciation of the otherness in the other,⁷⁷ virtues that the Nigerian Jesuit theologian, Agbonkhianmeghe Orobator calls “the pristine traditional African ethics”⁷⁸ What contemporary Africa thus faces is a disorientation of the traditional ethical worldview. The contrast between the *Katongolean* image and African moral values indicates that the traditional ethical system is gradually being replaced by a different narrative laced with violence, greed and exploitation. This paper examines the foundations of traditional African ethics with focus on the community and its anamnestic thought-structure. It highlights two historical events (slave trade and colonization/missionary activities) that significantly dismantled the African value system and replaced it with a different narrative. The paper proposes a twofold path to ethical reconstruction in Africa, namely: rejection and adapted revival, insisting that for the reconstruction to see the light of day, the African value system must find its way back into the mainstream of character formation.

⁷⁶ Discussing the core of ethics in Africa, the Tanzanian moral theologian, Laurenti Magesa, argues: “everything is perceived with reference to life...the mystique of life”. Laurenti Magesa, *Anatomy of Inculturation: Transforming the Church in Africa* (Nairobi: Paulines Publication Africa, 2005), 77. Agbonkhianmeghe Orobator, S.J. explains further, “life represents the ultimate common good, the shared patrimony of the group, and the burden of care incumbent on each member. Life is the guarantee of wholeness and universal harmony within and between the material and spiritual realms. Life creates an unconditional duty towards action. To be morally upright is to act deliberately in favor of human life” Agbonkhianmeghe Orobator, S.J. “Ethics Brewed in an African Pot” in *Journal of the Society of Christian Ethics*, 31, 1 (2011), 3-16, 4-5

⁷⁷ Martin Prozesky, “Cinderella, Survivor and Saviour: African Ethics and the Quest for a Global Ethic”, in Munyaaradzi Felix Murove, ed. *African Ethics: An Anthology of Comparative and Applied Ethics* (Scottsville: University of KwaZulu-Natal Press, 2009), 9

⁷⁸ Agbonkhianmeghe Orobator, S.J. “Ethics Brewed in an African Pot” 9

The Centrality of the Community: A Commitment to Relationality

The lizard that abandons the foot of the tree gets caught (Igbo Proverb)

A lot of ink has been poured on the anthropocentric dimension of African ethics. There exists a consensus among most African scholars that the value and dignity of a person is only realized in relationship with others.⁷⁹ An African individual is a communal being, inseparable from, and incomplete without others. According to John Mbiti, “only in terms of other people does the individual become conscious of his being, his own duties, his privileges and responsibilities towards himself and towards other people. The individual can only say “I am because we are; and since we are, therefore I am””.⁸⁰

Mbiti’s observation presents the notion of community understood not just as a collection of individuals who happen to be together, but that, which carries within it the idea of “belongingness”,⁸¹ “bondedness to natural life”,⁸² and the “feeling of being in a network of life”.⁸³ From this flows the ethical imperative not to treat the other (including nature) as a means, since the other is also part of the self. The feeling of being in a network of life connects the African individual to four communities: the community of fellow human beings, the community of the natural environment, the community of the living dead, and the community of the unborn.⁸⁴ It is by virtue of belonging to these communities that human beings attain their humanness. The community therefore, rather than natural law, is the starting point for African ethics.

⁷⁹ All African authors mentioned in this paper agree to this.

⁸⁰ John S. Mbiti, *African Religions and Philosophy* (London: Heinemann, 1969), 108-109

⁸¹ Mluleki Munyaka and Mokgethi Motlhabi, “Ubuntu and its Socio-moral Significance” in Munyaradzi Felix Murove, ed. *African ethics*, 69

⁸² Munyaka and Motlhabi, “Ubuntu”, 69

⁸³ Harvey Sindima, *Africa’s Agenda: The Legacy of Liberalism and Colonialism in the Crisis of African Values* (New York: Maryknoll, 1995), 127

⁸⁴ Cf. for instance, Benezet Bujo, *Foundations of an African Ethic: Beyond the Universal Claims of Western Morality* (New York: Crossroad, 2001), 29

The commitment to relationality, and the grounding of morality in the concrete community, which render African ethics as radically anti-Platonic,⁸⁵ includes an equal “acknowledgement of other communities as architects of morality”.⁸⁶ This is what has been termed a “reiterative universalism” in African ethics.⁸⁷ Unlike a ‘covering law’ universalism, where the standards of the good are established in ‘closed’ terms, reiterative universalism “allows universal principles to take on validity within particular instances”.⁸⁸ This means that the African ‘community ethic’ involves a kind of universalism that remains context-sensitive, hence, open to dialogue and friendly to other contexts. The ethnic community, under this framework, becomes a starting point for further relations. The above underscores the importance of hospitality within the traditional value system. It is a kind of hospitality that goes beyond ordinary courtesy, but stems from a profound appreciation of the human worth. “One who is not a member of my own group is ultimately a member of the other, just as I myself am, and this means that I owe him respect and esteem. One is thus related to all human beings”.⁸⁹ This value explains the widespread of religious tolerance and the apparent non-politicization of religious differences in traditional Africa.⁹⁰ It explains the

⁸⁵ Cf. Benezet Bujo, *Foundations*, 8

⁸⁶ Benezet Bujo, *Foundations*, 8

⁸⁷ For more details on this concept, cf. Benezet Bujo, *Foundations*, 8

⁸⁸ Cf. Benezet Bujo, *Foundations*, 8

⁸⁹ Benezet Bujo, *Foundations*, 6. It has been argued that the community-oriented character of African ethics leaves no room for individuality or personal responsibility. However, studies in the Igbo concept of *chi*, (personal god in charge of individual destiny), the SothoTswana concept of *serti* and its *Nguni* equivalent *isithunzi* (vital force which greatly prizes human fulfillment through personal vigor) or even the practice of name giving prove otherwise. Bujo insists that any argument that does not accord a place to personal responsibility based on the community orientation of African ethics does not appreciate that “Africans do not think in ‘either/or’ but in ‘both/and’ categories”. This ‘both/and category’ also explains why relatedness is not restricted to human relations, but equally cosmic and theocentric. It explains why the universe is experienced in a dynamic inseparable totality, blurring the distinction between humanity and nature, the living and the dead, the divine and the human. Cf. Benezet Bujo, “Is There a Specific African Ethic”, in Munyaradzi Felix Murove, ed. *African ethics*, 113-116

⁹⁰ In the words of Wande Abimbola “there is respect for all the religious traditions of humankind. While we hold steadfastly to our beliefs, we respect the right of others to practice their own religion in their own ways, provided they do not infringe on the rights of others”. Cf. Wande Abimbola, “The Attitude of Yoruba Religion Towards Non-Yoruba Religions” in *Attitudes of Religions and Ideologies* ed., Leonard Swidler (New York: Edwin Mellen Press, 1990), 145

hospitality accorded to missionaries when they first set their foot on the African soil. Needless to say, this enduring value was both exploited, and significantly undermined by a model of evangelization that was both violent and inimical to other contexts.⁹¹

Anamnesis and Narrative

The fly that has no guide follows the coffin into the grave (Igbo proverb).

This proverb and its equivalents⁹² underscore the place of the elders/ancestors in character formation. One must listen to tradition in order to acquire virtue. The collective lifetime experiences, moral insights and wisdom of the forefathers/mothers are communicated to their offspring to enable them discover their own identity, leading to self-actualization. This in turn leads to group realization in anamnestic solidarity with the invisible community of the dead. Thus, “only in anamnestic solidarity with the living dead can moral norms be found”.⁹³ Also included in this anamnesis, as the above proverb illustrates, are the living who have played their part in shaping the community’s morality by their heroic acts of virtue. Elderly people (of virtue) qualify for this status. The elderly are integrated into the solidarity of the clan community. From them traditional values are learned since they advance the work of the ancestors. This explains why the concept of ‘old people’s home’ is alien to the traditional African society. The elderly instead become channels through which the wisdom of the ancestors is communicated to the young.

The communication of virtue and traditional values is carried out through narration. The narration is expressed in the words of the elders and embodied in the practices of the community. There are

⁹¹ I will return to this point when I discuss the path to destruction of African ethics.

⁹² For instance, A grasshopper that defies instructions, falls easy prey to the predator; what an elder sees sitting down, a child standing on the mountain sees not.

⁹³ Benezet Bujo, “Is There a Specific African Ethic”, 118

therefore two complementary aspects of the narrative dimension: the actual narration itself (stories, fairy tales, proverbs, etc), and the contexts that provide the 'body' to that which is narrated, "molds without which the narration loses some of its significance".⁹⁴ The two phases are very important for the communication of the virtues to be emulated and the vices to be avoided. Narratives foster education in virtue for the good of the community. Campaign against greed, injustice and dishonesty are at the heart of the oral literature directed towards the education of children. It is therefore in character building that narratives are manifested. This means that the community expresses itself through each individual action. The action of the individual narrates the community; at the same time the individual narrates his/her own self. This dimension is expressed already when a name is bestowed.⁹⁵ Names narrate both the circumstances of one's birth and the history of one's family and ancestors. Consequently, the child is expected to honor her/his name and to avoid anything that will tarnish it.⁹⁶ Narratives enable the child to achieve this through a dynamic interpretation of the ancestry experience. Thus, while the history and experience of one's ancestors and of elders are indeed taken seriously, they are not static, but must be re-presented and embodied in the context of the current situation. The two phases of the narrative dimension underlines the unity of theory and praxis, knowledge and body, in African ethics. Virtue is not only acquired by reason but "conquered" by the whole body.⁹⁷

The Path to Distortion: Slave Trade and Colonialism/Missionary Activities⁹⁸

One who wants to kill a dog gives the dog a bad name (Igbo Proverb)

⁹⁴ Benezet Bujo, *Foundations*, 27. The institution of initiation is an example of the contexts that provide the 'body'. For details on initiation practices, cf. John Mbiti, *African Religion*, 118-127; Laurenti Magesa, *African Religion: The Moral Tradition of Abundant Life* (Nairobi: Pauline Publications Africa, 2011), 77-154

⁹⁵ Benezet Bujo, *Foundations*, 28

⁹⁶ Cf. Akintunde Akinyemi "Yoruba Oral Literature: A Source of Indigenous Education for Children" in *Journal of African Cultural Studies*, vol. 16, no 2, December 2003, 161-179, 163

⁹⁷ Cf. Benezet Bujo, *Foundations*, 26

⁹⁸ The details of slave trade, colonialism, and the coming of Christianity is not the concern of this paper. I seek to highlight the effects on the African value system. For details on these events cf. Adrian Hastings, *The Church in Africa 1450-1950* (Oxford: Clarendon Press, 1994), cf. especially parts I and II, pp. 3 - 388

What has been referred to as the “pristine traditional African ethics”⁹⁹ began the path of alteration with the coming slave trade and colonialism. In most of sub-Saharan Africa the later came with Christianity. The result of these was nothing less than catastrophic: condemnation and massive disruption of traditional ethical values and ways of living, breakdown of family life, and a process of subjugation, which not only lasted until the end of colonialism and apartheid, but still continues in what scholars have termed ‘coloniality’.¹⁰⁰ While not attempting to ‘play the blame game’, it would amount to an exercise in futility to initiate a task of reconstruction aimed at shaping a future that avoids the repetition of past mistakes, without an adequate knowledge of past influential events. As the African proverb puts it ‘he who does not know where he is coming from hardly understands where he is going’.

Pope Nicholas V, in his 1454 papal bull, *Romanus Pontifex*, accorded to the king of Portugal a monopoly in slave trade and other trade exploration along the west coast of Africa. Philosophers, theologians, and human rights activists accepted the legality and morality of black slavery as a given.¹⁰¹ In fact, while the church cooperated with this heinous crime against humanity, perpetrated by human beings who despised other human beings, and whose quest for profit knew no limits, medieval Christianity provided a theological justification. John Paul II during his visit to one of the principal slave ports (Goree, Senegal) called on Africans to forgive the inhuman crime committed by those who called themselves Christians.¹⁰² Notwithstanding, the scars still remain. Discussing the disorganizing and devastating effects of the slave trade on African societies, and the

⁹⁹ Agbonkhianmeghe Orobator, S.J. “Ethics Brewed in an African Pot” 9

¹⁰⁰ The term expresses the continued influence and exploitation of poorer countries by the rich even after colonialism. A typical example is evident in how the World Bank and IMF exploits and shapes the policies most sub-Saharan African countries as to benefit the richer countries. This is done in the guise of aid. Michael Goldman who, in his words, “spent ten years in the intestines of the World Bank” has done a detailed study on this. Cf. Michael Goldman, *Imperial Nature: The World Bank and Struggles for Social Justice in the Age of Globalization* (New Heaven and London: Yale University Press, 2005), see for instance xi - xii

¹⁰¹ Theologian and human right activist Bartolome de Las Casas readily comes to mind. Cf. *ibid.*, 21

¹⁰² Cf. John Paul II, “De ce sanctuaire africain de la douleur noire, nous implorons pardon” *Documentation Catholique*, no 2047, April 5, 1992, pp. 324-325

consequent implication on the ethical system, Elochukwu Uzukwu was apt, “the mentality came into existence that one person sells another to become rich... The value of values – human life – was devalued...many sons and daughters of Africa were denied their humanity and consigned to dungeons and concentration camps for slave labor. Values which were built for thousands of years were consigned to the dust-bin for European trinkets. Instead of protector of the people, the leader became the enemy of the people. Instead of solidarity among members of a kingdom or village group, one sold one’s kinsmen for wealth. Instead of the law of hospitality, the stranger was unsure of his or her life...human life, which the African vision of the world projected as the value to be protected, nurtured and enhanced was cheapened”.¹⁰³

If slavery weakened the African society and her moral codes, colonialism totally subjugated and destroyed them. The colonial ideology was aimed at domination and exploitation of both human and natural resources of the colonized, intended to derive maximum profit from minimum investment.¹⁰⁴ To realize this objective, the colonizers demonized the being, culture, and worldview of the colonized, a tactic reminiscent of the African proverb: ‘the one who wants to kill a dog, gives the dog a bad name’. Having thus labeled the African culture ‘pagan’, the way was paved for western Christian cosmology and its notions of the person, and community to displace African cosmologies. Having also categorized the African person as sub-human,¹⁰⁵ forced labor was imposed to develop colonizer’s home economies while local production industries were discouraged.

Forced labor means that work was no longer done for the interest of the community but for the predators. One could therefore cheat. The ground for corruption in the public service was watered.

¹⁰³ Elochukwu Uzukwu, *Listening Church: Autonomy and Communion in African Churches* (Eugene, OR: Wipf and Stock Publishers, 2006), 23

¹⁰⁴ Virginia DeLancy, “The Economies of Africa” in April A. Gordon and Donald L. Gordon, eds., *Understanding Contemporary Africa, fifth Edition*, 115-165, cf. 117-120

¹⁰⁵ This ideology was partly used to justify the slave trade

The greed, violence and exploitation that were instituted by the colonial masters constituted a big slap on the sense of community and humane living, which grounded traditional African notion of work. The campaign against greed that constituted the corpus of oral literature through which virtue is communicated to children, and the respect for the human worth that characterized the traditional value system was set on the path of disintegration. It has therefore been rightly observed that “civil service and the whole apparatus of state, began with an inherent lie”.¹⁰⁶ Katongole puts it rather more succinctly, “at the heart Africa’s inception into modernity is a lie. Modernity claims to bring salvation to Africa, yet the founding story of the institution of modern Africa rejects Africa itself”.¹⁰⁷ The veracity of the above observations is evident. It is a lie which gave birth to modern African states in the first place, it is a lie concealed in honorable ideals such as civilization and humanitarianism, it is a lie that accepted the dispensability of African lives as a normal way of nation-state politics, creating its mimetic performance in postcolonial successors who had no qualms in perpetuating the same wanton sacrificing of lives in pursuit of their political ambitions, it is a lie that ultimately demonized the pristine traditional value system and replaced it with a different narrative rife with greed, exploitation, and violence. Onwuejeogu’s interview with Nwaokoye Odenigbo captures the disparity between the ‘pristine’ African ethics and what colonialism introduced: when the white men came, they asked us to abrogate our moral codes. They said they had brought peace based on different ideas. We agreed and decided to watch them. Today we see war everywhere, we see people strangle others to acquire their wealth. The white men have not brought peace. We *Nri* people brought peace when we ruled. The white men came and stopped us from ruling. White men have arms but we do not believe in fighting. Fighting spills blood on the

¹⁰⁶ Elochukwu Uzukwu, *Listening Church*, 31

¹⁰⁷ Emmanuel Katongole, *The sacrifice of Africa*, 20-21

earth and it is an abomination. The white men began by killing those who did not agree with them, we *Nri* condemn it.¹⁰⁸

Military superiority and Christianity were the vehicles for the realization of the colonial ideology. Its successful implementation alienated the colonized. In the Catholic Church for instance, Latin rituals were introduced with their patterns of initiation, while the native rituals of initiation were not only discouraged but labeled diabolic. This is how Africa was invented, and put in the path of anthropological impoverishment.¹⁰⁹ How can Christ possibly be the model for African virtue of hospitality when he “entered the African scene as a forceful, impatient and unfriendly tyrant, [and] was presented as invalidating the history and institutions of the people in order to impose his rule upon them”.¹¹⁰ The coincidence of missionary activities and colonial occupation in most of sub-Saharan Africa, and the cooperation between the two highlight this concern. Rather than substantiating the values of hospitality, tolerance and humaneness intrinsic in the traditional ethical system, Christ became “the most visible publicized symbol of foreign domination and violence”.¹¹¹ Little wonder then why the name of Christ continues to be used for violence. In Nigeria for instance, it is not uncommon that Christians and converted traditionalists violently destroy ancestral shrines in order to proclaim that they have accepted Jesus as their Lord and savior.¹¹² The pristine African value system characterized by hospitality, context sensitive universalism, a deep appreciation of the other, and religious tolerance has become elusive. This underscores Bolaji Idowu’s profound unease with the missionary enterprise. According to him “Africans were required to shed their *Africanness* as part of the process of becoming Christians...it is now clear that by a

¹⁰⁸ See Onwuejeogw’s second interview with Nwaokoye Odenigbo in E. Isichei, *Igbo Worlds: An Anthology of Oral Histories and Historical Descriptions* (London: Macmillan, 1977), 27-28

¹⁰⁹ This is the point of V. Y. Mudimbe in his famous work, *The Invention of Africa: Gnosis, Philosophy, and the Order of Knowledge* (Indianapolis: Indiana University Press, 1988)

¹¹⁰ Enyi Ben Udoh, *Guest Christology: An Interpretative View of the Christological Problem in Africa* (Frankfurt: Peter Lang, 1988), 64

¹¹¹ Enyi Ben Udoh, *Guest Christology*, 74-75

¹¹² <http://www.washingtontimes.com/news/2007/sep/06/african-evangelists-destroy-artifacts/?page=all>. In Uganda, The Lord’s Resistance Army is another example.

misguided purpose a completely new God who had had nothing to do with the past of Africa was introduced to her peoples".¹¹³ The result was a long history of ignorance of African ethics since any surviving value is interpreted as deriving from non-African ethical luminaries such as Moses, Jesus, Muhammad, Aristotle, Kant, etc., and not from the so called dark continent.¹¹⁴

Conclusion: A Path to Reconstruction

This paper has examined the foundations of African morality and highlighted the evils of slave trade and colonialism as gravely distorting the African value system and replacing it with a new narrative laced with greed, violence and exploitation. The continued disintegration of the African value system and the simultaneous rise of violence and religious centers call for reflection. If the situation does not question the adequacy of ecclesial categories in virtue formation, it at least challenges us to look back on the values inherent in the traditional moral system, which produced a more humane society. This paper therefore suggests a twofold path to ethical reconstruction in Africa: rejection and adapted revival.¹¹⁵

By rejection is meant an educated refusal to a narrative that while condemning traditional values promotes a system interwoven with violence. The form of rejection advocated here is thus a process that begins with proper decolonized education. With an informed grasp of how the past affects the present, this process would pave the way for the rejection of the values that promote the disregard for human life that reached its zenith with the slave trade, the values that promote greed,

¹¹³ Bolaji Idowu, *African Traditional Religion: A Definition* (London: SCM Press, 1973), 75

¹¹⁴ Consider for instance Hegel's statement, "The [...] African character is difficult to comprehend. [Their] consciousness has not yet attained to the realization of any substantial objective existence—as for example, God, or Law—in which the interest of man's volition is involved. Knowledge of an absolute Being, an Other and a Higher than his individual self, is entirely wanting. The Negro [...] exhibits the natural man in his completely wild and untamed state. We must lay aside all thought of reverence and morality—all that we call feeling—if we would rightly comprehend him; there is nothing harmonious with humanity to be found in this type of character". G.W.F. Hegel, *The Philosophy of History* (New York: Dover, 1956 edition), 93. This same prejudice is also portrayed in Joseph Conrad's *Heart of Darkness* where Africa is described as "barbaric" and "a place of darkness" cf. (Dover 1990 edition) pp. 43, 48, 106

¹¹⁵ The details of these models go beyond the scope of this paper. Here, I present the essentials in a summary form

violence and exploitation rooted in the colonial system, and the demonization of the African culture and cosmology. If the bad name is not rejected, the effects will linger. On the contrary, the sacredness of life and respect for human worth must be revived, the positive values of community ethic must be revived and the method of virtue acquisition must be *adaptedly* revived. Here, the community's involvement in working out the details is paramount since ethics must be grounded in the concrete community. Fortunately, family life and kinship has proved resilient amidst these massive challenges. This paper suggests that school boards, curriculum planners, and educators should incorporate elements of traditional child education into the contemporary highly theoretical school system. There is no doubt that individual worth cannot be measured only in terms of academic certificates. It is also true that speculative knowledge without any foundation in the culture of its people is hardly effective. For ethical reconstruction of the African society therefore, it is the contention of this paper that the positive values in the traditional system must find its way back into the mainstream of character formation. It could be argued that this two-fold path is not achievable in the near future since it seems to have a heavy focus on the youths, yet one has to realize that if the seed of distortion was planted by historical events, it is possible to re-plant the seed of reconstruction by engaging in rejection and adapted revival. This call is urgent. As the African proverb says: the best time to plant a tree is twenty years ago. The second best time is NOW.

Bibliography

- Bujo, Benezet. *Foundations of an African Ethic: Beyond the Universal Claims of Western Morality*, New York: Crossroad, 2001
- Goldman, Michael. *Imperial Nature: The World Bank and Struggles for Social Justice in the Age of Globalization*, New Heaven and London: Yale University Press, 2005
- Gordon, April A. and Gordon, Donald L. eds., *Understanding Contemporary Africa, fifth Edition*, Boulder: Rynne Rienner Publishers Inc., 2013
- Hegel, G.W.F. *The Philosophy of History*, New York: Dover, 1956
- Idowu, Bolaji. *African Traditional Religion: A Definition*, London: SCM Press, 1973
- Isichei, Emmanuel. *Igbo Worlds: An Anthology of Oral Histories and Historical Descriptions*, London: Macmillan, 1977
- Kasenene, P. "Ethics in African Theology" in Villa-Vicencio and J. de Gruchy, *Doing Ethics in Context: South African Perspectives*, Cape Town: David Philip Publishers, 1994
- Katongole, Emmanuel. *The Sacrifice of Africa: A Political Theology For Africa*, Grand Rapids: William B. Eerdmans, 2011
- Magesa, Laurenti. *Anatomy of Inculturation: Transforming the Church in Africa* Nairobi: Paulines Publication Africa, 2005
- _____, *African Religion: The Moral Tradition of Abundant Life*, Nairobi: Pauline Publications Africa, 2011
- Mbiti, John S. *African Religions and Philosophy*, London: Heinemann, 1969
- Mudimbe, V. Y. *The Invention of Africa: Gnosis, Philosophy, and the Order of Knowledge*, Indianapolis: Indiana University Press, 1988
- Murove, Munyaradzi Felix, ed. *African Ethics: An Anthology of Comparative and Applied Ethics*, Scottsville: University of KwaZulu-Natal Press, 2009
- Shorter, Aylward. *Songs and Symbols of Initiation: A Study from Africa in the Social Control of Perception*, Nairobi: Catholic Higher Institute Publications, 1987
- Shutte, Augustine. *Ubuntu: An Ethic for a New South Africa*, Pietermaritzburg: Cluster Publications, 2001

Sindima, Harvey. *Africa's Agenda: The Legacy of Liberalism and Colonialism in the Crisis of African Values*, New York: Maryknoll, 1995

Uzukwu, Elochukwu E. *The Listening Church: Autonomy and Communion in African Churches*, Eugene, OR: Wipf and Stock Publishers, 2006

Journals

Akintunde Akinyemi "Yoruba Oral Literature: A Source of Indigenous Education for Children" in *Journal of African Cultural Studies*, vol. 16, no 2, December 2003, 161-179

Karin Barber, "Multiple Discourses in Yoruba Oral Literature" in *Bulletin of the John Rylands University Library of Manchester*, 73 (3), 11-24

Orobator, Agbonkhianmeghe S.J. "Ethics Brewed in an African Pot" in *Journal of the Society of Christian Ethics*, 31, 1 (2011), 3-16

Online Sources

www.youtube.com/watch?v=JpjWVELEeCk

<http://www.washingtontimes.com/news/2007/sep/06/african-evangelists-destroy-artifacts/?page=all>

www.nij.gov/.../gun-violence/.../welcome.asp

www.iamsyria.org/daily-death-toll.html.

The Effectiveness of Homework Assignments in Cognitive Behavioral Therapy for Public
Speaking Anxiety: A Hypothetical Case Study

Cebraïl Karayigit

PhD Student at Duquesne University

Introduction

Have you faced the situation of a student asking to be excused for his or her presentation? Each student has to give 15 minutes in class presentation in one of the college courses. One of the students has approached the instructor to be excused for this requirement because of struggling the fear of public speaking. After having a conversation with student, the instructor has decided to refer the student to the counselor. This is only one example of situation where a student needs to manage his/her anxiety to speak in front class. How can a counselor help the student to cope with his/her public speaking anxiety?

Many people have considered public speaking as one of the top fears they have in their lives (O'Hair, Stewart & Rubenstein, 2012). College students are not an exception. When working with college students, as counselors, helping to reduce their anxiety can be very important for their journey to reach their goals. While anxiety can negatively affect students' public speech performance, reducing students' anxiety will lead more successful speaking presentations (Witt, Roberts, & Behnke, 2008). Therefore, counselors should provide a therapeutic approach that helps reducing students' anxiety in their difficulties with speaking in front of people. There have been numerous studies on child anxiety. In this concept, while CBT is considered to be an effective treatment for students' anxiety in school setting (Chiu, Langer, McLeod, Har, Drahota, Galla, Jakops, Ifekwunigne, & Wood, 2013), it is also important to suggest effective strategies for helping college level students in their speech anxiety. In this article, the technique of homework assignment in CBT is implemented in a case study to show its effectiveness in college settings. Before reviewing some key points about using homework assignments; the basic concepts of Cognitive Behavioral Therapy will be introduced.

Cognitive Behavioral Therapy (CBT)

Aaron Beck is an important contributor for Cognitive Therapy and his research on depression had a strong effect on developing Cognitive Therapy (Corsini and Wedding, 2005).

Albert Ellis is another important contributor for the development of Cognitive Therapy and both Ellis and Beck believed that people's conscious beliefs and underlying assumptions are very important in understanding their problems (Corsini, Wedding, 2005). Corey (2009) contends that both Ellis and Beck developed their approach as a method of dealing with their own problems in their lives. For example, since Beck struggled with anxiety in his childhood, he used his personal problems as a basis for understanding others and developing his theory (Corey, 2009).

Significant and insightful research has been conducted in an attempt to understand more about human being from different viewpoints. Many questions have been raised in this context, such as: Are people victims of their past? What are people's primary disturbances? Cognitive Behavioral Theory attempts to answer these questions by stating that people are not disturbed by past events, however, people are disturbed by their unhealthy thought patterns. In other words, Cognitive Behavior Theory does not view people as victims of their past, CBT instead asserts that we do what we do because of the way we think.

People can sometimes reflect their interpretations of situations in a rigid and anxious manner because they experience psychological distress when facing threatening situations (Corsini & Wedding, 2005). Therefore, people's interpretation of situation can be a crucial thing

for healthy thoughts and behavior. Following is a great quote from the Stoic philosopher Epictetus: “Men are disturbed not by things but by the views which they take of them.” Epictetus' statement provides a purely rational approach to Cognitive Behavioral Theory. How we think affects how we feel and how we act. In other words, our behaviors are determined by our thinking and feeling. There are times when we all experience the same event but we are affected at different levels. The same event may have different meanings for two individuals because people interpret things differently (Corsini & Wedding, 2005). Cognitive Behavioral Therapy helps people to promote more constructive and positive views on their lives. If a person changes his or her negative thoughts to more positive directions, he or she will be able to respond to the change.

Using Homework Assignments in Cognitive Behavior Therapy

In some cultural contexts, students tend to get directions from their teachers and counselors. Therefore, homework assignments can be one of the most effective tools for counselors to help these students. Based on my personal and anecdotal experiences, I have observed that using homework is an effective technique when working with students who have public speaking anxiety. There have been many articles and studies about using homework assignments as an important tool in therapy. The use of homework assignment in CBT has been considered as an effective intervention in clinical practice (Kazantzis, Deane, Ronan & L'Abate, 2005; Gonzalez, Schmitz & DeLaune, 2006). Kazantzis and colleagues (2010) stated that research on utilization of homework assignment has continued in the past decade, and homework is one of the most studied concepts of CBT. In a vast majority of similar research,

there is a strong focus on using homework assignment in cognitive behavioral therapy. Dozois (2010) stated that use of homework has been an important part of CBT since its starting point, and the major goal in CBT is putting the words in action.

Although homework is a known to be a common topic of discussion in CBT, there are many questions regarding its effectiveness and use in practice (Kazantzis, Arntz, Borkovec, Holmes & Wade, 2010). Counselors, who use CBT, should make sure that the goal setting process is a collaborative process in which both counselors and clients are involved together to set clear and specific homework assignments, which can be evaluated during the process (Dozois, 2010). Therapists can also integrate homework assignments into sessions as a structured aspect of the therapy (Kazantzis & Dattilio, 2010). Dozois (2010) states that the homework assignments in therapy allow clients to reinforce their behavior, find solution for their actions, and develop cognitive and behavioral skills. CBT techniques are more suitable with directive approaches due to their structural nature. Utilization of CBT techniques in a rigid fashion can be destructive rather than constructive. Therefore, therapist should be aware that their use of the CBT techniques might have a great affect on the outcome (Kazantzis, Arntz, Borkovec, Holmes & Wade, 2010). Therapist should also be careful regarding how they present the homework assignments to the clients, because clients may perceive the therapist as an authority figure—clients may have negative views on people asking them to do things (Kazantzis, Arntz, Borkovec, Holmes & Wade, 2010). It is important for clients to complete the homework assignments between the sessions, because completion of assignments indicates skills has been transferred from session discussions to the real life. When clients start applying

the learned skills in different contexts, it is evident that clients have developed higher level of generalization (Kazantzis, Whittington & Dattilio, 2010).

The following pages provide a case study to demonstrate the application of homework assignment in therapy with a student on his/her public speaking anxiety. In this hypothetical case study, a first-year college student has to give a presentation in class but feel anxious about speaking in front of class. By using homework assignments in Cognitive Behavioral Therapy, the counselor wants to help him reducing his anxiety. What can be done to reduce a student's public speaking anxiety? How a counselor can set up homework assignments? This case study will show the efficacy of homework assignments on a 17-year-old college student about his public speaking anxiety. The study includes 6 cognitive behavioral therapy sessions with the student. The student is given some homework assignments between sessions to overcome the fear of public speaking anxiety.

Case Example

Michael is a 17 years old first year male student in a college. He tells the counselor that he would like to work on his public speaking anxiety and would hope to get help to prepare for his presentation, which he is required to give in two months. From his assessment, Michael appears to suffer from depression and general anxiety. Cognitive-behavioral therapy can be considered as an important treatment for adolescents suffering from depression and anxiety (Kennard et al., 2009). Therefore, the counselor is interested in the student's problem from cognitive behavioral therapy and wants to work collaboratively with the student to give him some homework assignments to overcome his public speaking anxiety. Michael's treatment

goal is to ultimately decrease his feelings of anxiety. Michael's first treatment objective aims to decrease his negative feelings towards himself to reduce his feelings of anxiety. To do this, the counselor and Michael will work in individual sessions to identify Michael's negative cognitions about himself and recognize how his cognitions affect his thoughts and behaviors. The counselor and Michael will work together to use role-play techniques, utilize her cognitive abilities and set homework assignments collaboratively to reduce his public speaking anxiety.

Once the therapeutic alliance is developed, the counselor start using the technique of homework assignment with Michael to overcome his anxiety. Therapy consists of 6 sessions with the student. From the initial session, the counselor asks the student to give some background information about his difficulty. For example, the student makes the following statements regarding his anxiety to present in class: "I have always felt overwhelmed when I'm around people", "I can easily get nervous when I have to speak in front of people" and "I can never give a presentation because I freeze up and forget my words". Over the course of several conservations with the student, the counselor discovered that the student has some self-defeating beliefs about himself. For this reason, the counselor begins to educate him about his self-defeating beliefs.

When talking with Michael, the counselor would help Michael to uncover his self-defeating beliefs that Michael reveals in conversation. For example, Michael stated that he is not comfortable when speaking in public because no one in this world loves him. In this situation, the counselor challenges the student whether he is loved or not. At first sessions, the counselor reflects his implicit feelings of anxiety. As a homework assignment, the counselor had Michael to write down five people that he believes to love him. By writing down and seeing on

paper the people that love him can show him that he is indeed loved. This technique would aim to target his core belief of “I’m worthless” and the self-defeating beliefs that are associated with his public speaking anxiety. In this way, the counselor integrated cognitive restructuring method into the homework assignments to encourage him to think positively about himself.

In a subsequent session, the counselor asks the student to take action to step forward. Working collaboratively with the student, the counselor creates another homework assignment. Before setting homework assignments, the counselor points out the importance of homework completion. As the second homework assignment, the counselor asks him to approach and have a conversation with three classmates he does not know well. In this way, the student is encouraged to take action. In this step, the counselor works on behavioral techniques to help Michael decrease his feelings of anxiety. The similar assignment with behavioral techniques is carried in other sessions to perform communication skills. During a subsequent session, the student is given homework, which includes asking a question in each class during the week. The purpose of this is gradually to prepare him for his presentation. When Michael starts to ask questions, he feels more comfortable speaking in front of people. For these assignments, Michael is asked to rate on a scale of 0 to 10 the degree of pleasure experienced during each activity. By doing this, Michael is able to contradict and challenge his self-defeating beliefs.

Lastly, the counselor also integrated another cognitive technique called decatastrophizing into the homework assignment. The student is presented with the discussion of decatastrophizing and is given a homework assignment. In this homework assignment, the student is asked to think and write a possible negative outcome of his presentation. The

purpose of this assignment is to prepare for the consequences of Michael's anxiety. The student is asked to write statements like "What if I forget my words in my presentation? In a subsequent session, the counselor check in with the student to see if confronting his fear of presentation and making a plan reduces the anxiety associated with it. The counselor asks Michael what would happen if you freeze up and forget your words or being laughed at when giving the presentation and Michael would express what he believes to be the worst outcome (i.e., crying) but also the best outcome (i.e., stand up for himself). By this homework, the counselor wants to allow him to create plans for his fears on the presentation, which gives him more control over them and reduces his worry about them. This assignment can also help Michael to develop a plan to cope with his presentation and similar scenarios.

After student implements these assignments, he begins gain a new perspective about his capacity. This was very important because he was able to apply the learned skill in daily life. The student starts to dispute his self-defeating beliefs gradually, and he begins to perform more effective behavior. In the last session, the student seems more confident about his presentation in class.

This case study is offered as an example of how use of some specific homework in cognitive behavior therapy that may be effective in school settings, especially with students who have self-defeating beliefs and dysfunctional thoughts that leads public speaking anxiety.

Strengths and Limitations

One of the main limitations is that this study offers a hypothetical case study; there is a need for real anecdotal and case examples to show the effectiveness of homework assignment.

Some of the ethical issues that come up any time in any research working with college students and multicultural populations is the perceived differences in the uses of counseling, issues of confidentiality, cultural distinctions between the role and function the counselors serve in developing student success plans, and with providing treatment for other common reasons for which people seek counseling such as depression and anxiety.

Given the rich history and literature of cognitive behavioral applications for most of the presenting issues for which people seek counseling, the unique angle for this study is that in Turkey and in the Muslim world broadly, the population is not well researched with respect to counseling in general and cognitive behavioral therapy in particular. In any research, there are always methodological and ethical challenges, and for the purposes of my own study, the benefit is that I have had experience with students in the United States and Europe and knowledge of implementing the application of CBT.

Future Research

While there is plenty of research on the subject of cognitive behavioral therapy, there is a gap in the research related to its applicability across various multicultural populations, in particular those in the developing world and in the Middle East. Indeed, little research has been conducted on counseling in general in some of the oldest societies on the planet, including that of the Muslim world, including my native country Turkey. The aim of future research might be fostering a greater understanding of the uses of cognitive behavioral therapy in a part of the world that is relatively new to the psychotherapy that has been in Western Europe for the better part of the last hundred years.

Given my perspective and outlook on multicultural counseling, the aim of future research is to promote counseling interventions that work across cultures, students, linguistic differences, religious differences, and educational preparation. In other words, even though there is a growing body of support for the effectiveness of Cognitive Behavioral Therapy, most interventions might not work well in other cultures and there is a need to promote interventions, which could be effective in those cultural contexts. Recommendations for future research also includes developing a comprehensive research program that supports useful interventions for multicultural populations, and Turkey in particular because of the need for this research and the gap in the current body of literature.

\

References

- Chiu, A. W., Langer, D. A., McLeod, B. D., Har, K., Drahota, A., Galla, B. M., ... & Wood, J. J. (2013). Effectiveness of modular CBT for child anxiety in elementary schools. *School psychology quarterly, 28*(2), p.141-153.
- Corey, G. (2009). *Theory and practice of counseling and psychotherapy* (8th ed.). Belmont, CA: Brooks/Cole. Cengage Learning.
- Corsini, R.J. & Wedding, D. (2005). *Current psychotherapies* (7th ed.). Belmont, CA: Brooks/Cole. Cengage Learning,
- Dozois, D. J. (2010). Understanding and Enhancing the Effects of Homework in Cognitive-Behavioral Therapy. *Clinical Psychology: Science and Practice, 17*(2), p.157-161.
- Gonzalez, V. M., Schmitz, J. M., & DeLaune, K. A. (2006). The role of homework in cognitive-behavioral therapy for cocaine dependence. *Journal of Consulting and Clinical Psychology, 74*(3), p.633-637.

Kazantzis, N., Arntz, A. R., Borkovec, T., Holmes, E. A., & Wade, T. (2010). Unresolved issues regarding homework assignments in cognitive and behavioural therapies: An expert panel discussion at AACBT. *Behaviour Change*, 27(03), p.119-129.

Kazantzis, N., Deane, F. P., Ronan, K. R., & L'Abate, L. (2005). *Using homework assignments in cognitive behavior therapy*. New York, NY: Taylor & Francis Group, LLC.

Kazantzis, N., & Dattilio, F. M. (2010). Definitions of homework, types of cognitive behavior therapy and psychoanalytic theoretical orientations. *Journal of clinical psychology*, 66(7), p.758-773.

Kazantzis, N., Whittington, C., & Dattilio, F. (2010). Meta-analysis of homework effects in cognitive and behavioral therapy: A replication and extension. *Clinical Psychology: Science and Practice*, 17(2), p.144-156.

Kennard, B., Clarke, G., Weersing, V. R., Asarnow, J., Shamseddeen, W., Porta, G., . . . Brent, D. (2009). Effective components of TORDIA cognitive-behavioral therapy for adolescent depression. *Journal of Consulting and Clinical Psychology*, 77, p.1033–1041.

O'Hair, D., Stewart, R., & Rubenstein, H. (2012). *A speaker's guidebook: Text and reference*. New York: Bedford/St. Martin's Press.

Witt, P. L., Roberts, M. L., & Behnke, R. R. (2008). Comparative patterns of anxiety and depression in a public speaking context. *Human Communication*, 11(2), p.219-230.

Numbers and Proportion in Performing Arts:

An Exploration of Musical Space in Stravinsky's *Agon*

Ben Meyer

Mary Pappert School of Music

Numbers and music share a synergy in which spatial attributes can be created by the interplay of structure, compositional process, and performance. In this study, I consider the consistencies of musical structure and musical space by closely examining the spatial modality of musical language in the twentieth century music. By closely examining the formation of musical structure, orchestration, and choreography, my analytical study thus delves into Stravinsky's compositional process that relates twelve-tone rows to musical space by combining dance movements and numerical proportions in his work *Agon: A Ballet for Twelve Dancers*. Specifically looking at the unfolding of Stravinsky's multimodal spatiality found in the selected movements of *Agon*, I propose an analytical framework in which I explore the reciprocity of music and space. As I examine the relationship of numbers and proportion in Stravinsky's piece as an attribute to the compositional process, I develop a methodology by which a closer look at Stravinsky's work reveals dissecting similarities and polarities with mathematics and proportion. In this way, new dimensions of compositional techniques are aimed to merge the divergent lines between musical space and musical structure, suggesting a unique perspective on Stravinsky's compositional process. Based on the composer's personal accounts and contemporary analyses of Stravinsky's works, my study thus suggests possibilities of conceptualizing music that forms a bond with

mathematics and musical structure, embodying a kaleidoscopic impression depicting a “symphony of space.”

In this study, music is connected to mathematics. Music as an atmosphere can depict spatial attributes, which defines musical space as an interplay of sound, numbers, and time. Within this study, I explore Stravinsky’s compositional process, developed in the 1950’s that achieve these three key points. The revelation of spatial tonality creates a process to develop and form such means to suspend music while still upholding to the compositional practices of the twentieth century. In this explorative study, I examine serialism, in which the twelve tones of a chromatic scale are linearly ordered into a row consisting of the twelve notes, as a compositional device used by Igor Stravinsky to merge with the performance arts. The ordered sequence of notes within the row are abstracted and arranged into a series to complete a chromatic scale, but will not appear in its pure ascending or descending form. Serialism is attributed to a post-tonal way of making music as the conventions of tonal compositions, using major and minor keys, are left absent (Whittall 2008). In addition to Igor Stravinsky, many composers used several processes to create visuals to demonstrate such structure and proportion by combining synergies between music and space. For example, Béla Bartók with the use of his Golden ratio, aimed to allow music to unfold and create a dissonance that which explored new avenues for music (Antokoletz 1984). Olivier Messiaen also contributed to such of a process by putting significance on numbers and conceptualizing music to make various designs such as spirals (Bruhn 2007). The composers used mathematical equations involving the Fibonacci number system for example. In this case, each number is a sum of the previous two, embodying symmetry within musical space depicting spirals (Duerden 2007). In fact, music and numbers share a collaboration that which creates a spectral ambience that aligns with spatial modality and proportion. Within the spectral field of music, harmonic overtones blend the

lines between sound, numbers, and time to create an ambience of musical space. The revelation that mathematics can conceptualize music inspired twentieth century composers in their endeavor to create music that would shape the current century while acknowledging the practices used in the past. In doing so, a geometry of music can be attained by using a process to conceptualize music into a permuted symmetry (Tymoczko 2011). This can be combined with various art forms. In the case of ballet for Igor Stravinsky, dances were explored to create a choreography creating an alliance between music and space. This compositional practice aims to compose music as it relates to bodily movements, sharing reciprocity with choreography and spatial modality to which embodies musical space.

Igor Stravinsky developed many techniques that widely developed his compositional competence throughout his life. He was born on June 17, 1882 in Oranienbaum, Russia and had three brothers who were musically inclined (Griffiths 1992). At age nine, he began to study the piano, and in his later teens, he studied music theory. His most influential teacher, Rimsky-Korsakov, taught him composition and orchestration privately (Grout, Burkholder, & Palisca 2006). He was well renowned for composing *The Firebird*, *Petrushka*, and *The Rite of Spring*. However, it was not until his later years between 1951-1959 that the Russian composer discovered serialism (Walsh 2015). His early proto-serial works where Stravinsky began assimilating his influence of Anton Webern and twelve-tone serialism includes *The Cantata* (1951-1952), *Septet* (1953), *In Memoriam Dylan Thomas* (1954), and the *Canticum Sacrum* (1955). All of which led to his creation of *Agon: ballet for twelve dancers* (Joseph, 2011). George Balanchine, who choreographed the piece, worked with Stravinsky to compose the ballet. As Walsh (1993) reports in his biography of Igor Stravinsky, *Agon* became a distinctive change in which influenced music and choreography for ballet to develop a style towards serialism.

During the 1950's, ballet emerged as a new frontier for musical exploration as Stravinsky assimilated compositional processes towards musical space, depicting a symmetry between orchestration and choreography. *Agon* marks the most significant change in Stravinsky's music and developmental style towards serialism. Stravinsky's process assimilated tiny cells of music, called proto-serial fragmentation, to the choreography created by George Balanchine (Straus 1999). This process, although constantly evolving, attributed to Stravinsky's ever changing attitudes towards serialism in which creating a synergy between numbers and music by the influence of twelve-tone serialism based upon the avant-garde reaction felt from World War II (Taruskin 1996). This compositional process led to the discovery of twelve-tone serialism and space. He began to compose music that shared the process of serialism that many composers of the twentieth century experimented with. In fact, many of the composers used a process to conceptualize music based upon proportion that which created visuals to demonstrate the congruence between structure and proportion, forming musical space. Stravinsky's composition of *Agon* took place from 1954-1957, where the production's work was interrupted and resumed three times during his work on *Memoriam Dylan Thomas* in 1954 and his *Canticum Sacrum* in 1955 (Joseph 2002). Other progress was halted due to health issues. Stravinsky celebrated his seventy-fifth birthday as he began his explorative journey towards serialism. Walsh (1993) identifies that after returning from his later works, Stravinsky's serialism and interpretation to the number twelve began to take more affect fully. He continued work during his later years while still conducting many concerts and recordings until two years before his death on April 6, 1971 (Oliver 1995).

Studies of Stravinsky's work of *Agon* have discovered a reference to sixteenth and seventeenth century French dances to which resonate with the Greek origin of the word "Agon" for contest. For instance, Lincoln Kiristein, co-founder of the New York City Ballet, shared collaborative letters between him and Balanchine to which inspired Stravinsky's fascination of Greek mythology in ballet. Stravinsky's imagination, frequently ignited by epiphanies caught fire under the

impression of a book given to him by Kiristein titled, *Apologie de la danse* by Francois de Lauze. This was in fact the most substantive dance treatise of the seventeenth century (Joseph 2002). In 1951, Kiristein offered the composer a \$5,000 commission to write the ballet. Stravinsky accepted and aimed to assimilate music and dance form of the twentieth century with grotesque movements, elaborate combinations of undistinguishable pulse fluctuations, and a system of orchestration to suspend the work into space with music and dance from the Renaissance (Jordan 2004). In writing to his publisher, Stravinsky explains, “I plan to compose my music without any blueprint for a plot. I will compose a kind of symphony to be danced” (Joseph 2011 170).

Throughout the piece, symmetry found to resonate with numerical proportion shares a commonality with the overarching form leading to the number twelve. In *Stravinsky, Balanchine, and Agon: An Analysis Based on the Collaborative Process*, Alm (1989) describes that the piece consists of three sections that are equitable to ratios derived from Stravinsky to twelve. According to Alm from Stravinsky’s original sketches with Balanchine, an estimation that “The three sections have a temporal ratio of approximately 1:3:1 – that is, the twenty-minute ballet requires about 4 minutes for section I, 12 minutes for section II, and 4 minutes for section III” (1989). Thus, this discovery examines the close attentiveness that Stravinsky held with his compositional practices of time and numbers. When composing the piece with Balanchine, many aspirations were made to have a synergy with multiples of twelve (Alm 1989). The form of the work can be subdivided into movements within the three sections and can be separated into multiples of four. Stravinsky then uses various preludes and interludes of recycled music to connect the music throughout the piece. The dancers shape the music to constantly connect with the next passage of music by not allowing for a break or pause within the piece (Mori 1997).

The framework in its entirety contains an order of proportion to tightly conceive the structure of the piece, which resonates with Greek order and proportionality. The “perfect

proportion,” according to the Greeks was 2:1 (Joseph 2011). This ratio is visually reflected in *Agon*. For example, the ballet has twelve scenes, the score is subtitled ‘ballet for twelve dancers’ and several of the movements are in multiples of twelve bars. Eight women and four men perform the ballet respectfully reflecting the ratio of 2:1. Additionally, the piece orally represents the Greek ratio of perfect proportion as many rhythmic elements employ two short values, directly followed by one long value. The work in its entirety contains serial elements that reflect the constant emergence of Stravinsky’s process to blend twelve-tone serialism with a framework to suspend music in space (Oliver 1995). Stravinsky was increasingly interested in the music of the past where he aspired to combine serial techniques of the post-Webern influential modern age and the Renaissance (Joseph 2011). In doing so, Stravinsky’s process, to which music and numbers relate to proportion and ratios, developed an endeavor to grow and sustain a new path for music. By fusing a thin, divergent line between musical styles of jazz and classical compositional techniques, his methodology of creating a process for musical space began to unfold.

Within the coda of the second section titled: *First Pas de Trois*, the beginning of a combinatorial progression of orchestrated twelve-tone serialism and choreography suspend time, numbers, and sound. Kirstein presented Stravinsky with a letter from Balanchine indicating his vision while planning the choreography. “He would like a ballet which would seem to be the enormous finale of a ballet to end all ballets the world has ever seen, mad dancing, variations, pas d’action, pas d’eux, ect., with a final terrific and devastating curtain when everyone would be exhausted” (Joseph 2011 172). Stravinsky responded and developed a process to appear within this coda with an aim to combine serialism and choreography. For instance, the process first creates an ambience of musical space to hyperbolize a significant use of silence between notes of the twelve-tone row. Throughout this process, the duration suspends each pitch from the series to transfix the music in space. Then, with a demanding array of movement, proportional ratios of male and female

dancers enter to add a contrapuntal layer of dissonance evoked from the musical space (Smyth 1999).

At first, the relationship between the movement patterns of the dancers and Stravinsky's spatial modality sound to disagree as if the two could not coexist. However, the choreography rightfully mimics Stravinsky's compositional techniques. In one instance found throughout the score, Stravinsky develops a significant use of angular octave displacement. Substituting enharmonic notes of a scale and placing them in different arrangements attain this technique. Intervals of ninths in place of seconds, for example, are used in which are mimicked by the dancers with pointillistic movements of leaps and turns. Within the choreography, the ratio of 2:1 is once again reflected in several movements throughout the ballet. In one example, two women dance alongside one man. The connection between chromaticism, a sense of order, and a sustained rhythmic pulse achieves reciprocity between mathematics and music creating musical space. By examining the score further, the solo violin is serially accompanied by gradual proto-serial fragments. Stravinsky's process is identified in which, an influence of tiny cells created by a substantial equilibrium of a numerical system, coordinates the music to imitate space. Moments of C major tonalities briefly emerge, derived from this process, but quickly resolve with an overlapping texture over D major tonalities. In consequence, Stravinsky maintains a post-tonal compositional technique. Walsh distinguishes the process in further investigation in the orchestration. He states, "The C major harmonies (the key being chosen perhaps to make full use of the overtone resonance of the solo cello's open C and G strings, and to let the best high harmonics on the double-basses) are simply turned upside-down and inside-out" (1993 231).

When compared to Stravinsky's Russian neo-classical periods, this piece is symptomatic of jazz-age ideology. The process of proto-serial fragmentation, to which elaborates on a chromatic twelve-tone row, creates an additive structure forming chords susceptible of jazz. Throughout the

process, a series of fragmented notes combine together to create chords of jazz construction while completing a process of serial fragmentation (Joseph 2011). The chords are suspended in time with the use of silence and isolation. Stravinsky uses this adaptation to reference the process used in previous movements throughout *Agon* (Walsh 1993). In *Imitation of an Innovator a Comparative Analysis of Agon by Igor Stravinsky and Dance Movements for Brass Quintet by David Snow*, Castro has analyzed and compared Stravinsky's style to other modern day works and has found that the style of jazz, in fact is very apparent throughout Stravinsky's work of *Agon*. The instrumentation of trumpet, harp, piano, violin, viola, cello, and double bass constantly explore jazz techniques. Castro explains that the work is Stravinsky's most successful use of jazz. For example, the first chord that can be outlined is a D minor eleventh, spelling D-F-A-C-G (Castro 2007).

As the ballet progresses, the sonorous interpretation of choreography and musical instrumentation opens the doors to musical space. Throughout the score, the time signature changes constantly, along with a rapid tempo to impose an inconsistency of pulse to which suspends the music. The two most occurring time signatures include a 3/4-meter and 3/8-meter. The performer is allowed to distinguish as he or she may with Stravinsky's use of dotted lines between measures of contrasting meter; thus allowing the performer to establish a necessary pulse when performing the work. This process, employed by Stravinsky, enables the performer to coexist music and space by creating a kaleidoscopic image evoking a combinatory process of choreography and music. In Balanchine's ideals of writing the choreography to match Stravinsky's process, the dancers portray a proportion that can be conceptualized by allowing the visual connotation of musical space to merge the lines of proportion and structure (Joseph 2011). Traditional French dances are also referenced for the performers to superimpose the Renaissance, but to create a 'symphony of space,' the dancers exaggerate their movements. In congruence to the music and numerical gravity in which *Agon* creates, there are some dances where the women lead the men in extreme poses. Several famous images, for example, showcase the extremity of the demanding

positions and movements. One in particular demonstrates the ballerina's agility while she extends her leg in the air, 180 degrees while the male dancer is lying flat on the ground ("Agon" 2009).

In conclusion, *Agon: ballet for twelve dancers* was based upon 16th and 17th century dance forms that had no silent break or pause between movements. Stravinsky's compositional practices adhere to the work of Balanchine's choreography for the music to create a spatial synergy with numbers and proportion. Robert Craft held the first performance in Los Angeles on June 17, 1957. The New York City Ballet also first performed the ballet by stage on December 1, 1957. According to Walsh, this work is believed to be Stravinsky's best and most original (1993). The balance of form and space is the separating factor that makes the ballet unique and outstanding compared to other works by Stravinsky of the time such as *Petruska*, *Orpheus*, and *The Rake of Progress*. This work leaves the Russian influence of neo-classicism from the past, in which a change has taken place within Stravinsky. *Agon* seems to have been a key work in blending the idea that modern compositional techniques might form a neutral alliance with numbers and proportion in the performing arts. The process of dissolution is in some sense typical of the whole form of the ballet (Walsh 1993). In general, the impression of musical spatiality to form a spectral image of numerical proportion in music is established. Thus, a variety of linear possibility, reflected in the constantly changing instrumental and choreographic proportion creates a dance symphony of space.

Work Cited

- "Agon." [Http://www.theballetbag.com/2009/10/05/agon/](http://www.theballetbag.com/2009/10/05/agon/). N.p., n.d. Web.
<<http://www.theballetbag.com/2009/10/05/agon/>>.
- Alm, I. (1989). Stravinsky, Balanchine, and Agon: An analysis based on the collaborative process. *The Journal Of Musicology: A Quarterly Review Of Music History, Criticism, Analysis, And Performance Practice*, 7(2), 254-269.
- Antokoletz, E. (1984). *The music of Béla Bartók: A study of tonality and progression in twentieth century music*. Berkeley: University of California Press.
- Bruhn, S. (2007). *Messiaen's contemplations of covenant and incarnation: Musical symbols of faith in the two great piano cycles of the 1940s*. Hillsdale: Pendragon Press.
- Castro, Edward. "Imitation of an Innovator a Comparative Analysis of Agon by Igor Stravinsky and Dance Movements for Brass Quintet by David Snow." University of Washington, 2007. Web. 13 Oct. 2015.
<<https://digital.lib.washington.edu/researchworks/bitstream/handle/1773/11326/3265309.pdf?sequence=1&isAllowed=y>>.
- Duerden, R. (2007). Dancing in the Imagined Space of Music. *Dance Research: The Journal of the Society for Dance Research*, (1). 73.
- Griffiths, P. (1992). *Stravinsky*. London: Dent.
- Grout, D., Burkholder, J., & Palisca, C. (2006). *A history of western music* (7th ed.). New York: W.W. Norton.
- Jordan, S. (2004). The Demons in a Database: Interrogating 'Stravinsky the Global Dancer'. *Dance Research: The Journal of the Society for Dance Research*, (1). 57.
- Joseph, C. (2011). *Stravinsky's ballets*. New Haven: Yale University Press.
- Joseph, C. M. (2002). *Stravinsky & Balanchine : a journey of invention*. New Haven : Yale University Press, c2002.
- Mori, A. (1997). Proportional exchange in Stravinsky's early serial music. *Journal Of Music Theory*, 41(2), 227-259.
- Oliver, Michael. *Igor Stravinsky*. London : Phaidon, 1995. Print.
- Smyth, D. (1999). Stravinsky's second crisis: Reading the early serial sketches. *Perspectives Of New Music*, 37(2), 117-146.
- Straus, J. N. (1999). Stravinsky's 'Construction of Twelve Verticals': An Aspect of Harmony in the Serial Music. *Music Theory Spectrum*, (1). 43.

- Stravinsky, I. (1957). *Agon: Ballet for twelve dancers*. London [etc.: Boosey & Hawkes.
- Taruskin, R. (1996). *Stravinsky and the Russian traditions: A biography of the works through Mavra*. Oxford: Oxford University Press.
- Tymoczko, D. (2011). *A geometry of music. Harmony and counterpoint in the extended common practice*. New York : Oxford University Press, 2011.
- Walsh, S. (1993). *The music of Stravinsky*. Oxford: Clarendon Press.
- Walsh, S. (2015). "Stravinsky, Igor." *Grove Music Online. Oxford Music Online*. Oxford University Press. Web. 13 Oct. 2015.
- <<http://www.oxfordmusiconline.com/subscriber/article/grove/music/52818pg9>>.
- Whittall, Arnold. *Serialism*. Cambridge: Cambridge UP, 2008. Print.

DUQUESNE UNIVERSITY

EVANGELICALS AT THE CLIMATE CHANGE CROSSROADS

GRADUATE STUDENT RESEARCH SYMPOSIUM 2015
DUQUESNE UNIVERSITY

NOVEMBER 20, 2015

BY
STEVEN A. PERRY

The results are in—and the findings are less than spectacular. In recent polls on attitudes towards climate change, evangelical Christians are the least likely group to accept both its reality and relevance.¹ Yet, in 2006, eighty-six evangelical leaders set out to address one of the great moral crises of this generation. The Evangelical Climate Initiative (ECI), a group consisting of various evangelical pastors, scholars, academicians and executives, put forward a document entitled *Climate Change: An Evangelical Call to Action*.² In it was a positive statement—from evangelical Christians—to evangelical Christians—acknowledging the real threat of climate change, while at the same time suggesting positive steps one could take to meet the challenge head on. The ECI placed ads in the *New York Times* and *Christianity Today* declaring to the American public their commitment to combat anthropogenic global warming.³ This “Call to Action” represented the efforts of many evangelicals from various denominations working together towards a common goal. Their statement became the high watermark of an evangelical response to global climate change.⁴ This historic achievement came about in spite of opposition from organizations such as the Cornwall Alliance, a group of evangelical theologians, scientists, economists and other scholars, who refer to those who believe that climate change is happening as “climate alarmists.”⁵ In order to understand the significance of the “Call to Action” from within evangelicalism, it

¹N., Smith and A. Leiserowitz, “American Evangelicals and Global Warming” *Global Environmental Change* Vol. 23 Issue 5(October 2013): 1009-17; Pew Research Religion and Public Life Project, April 16, 2009, <http://www.pewforum.org/2009/04/16/religious-groups-views-on-global-warming/> (accessed Nov. 21, 2013).

²“Climate Change: An Evangelical Call to Action,” in *The Global Warming Reader*, ed. Bill McKibben (New York: Penguin Books, 2012), 309-18.

³Katharine K. Wilkinson, *Between God and Green* (New York: Oxford University Press, 2012), xi.

⁴*Ibid.*, 43.

⁵Cornwall Alliance, *An Invitation to Christian College Faculty to Sign an Open Letter to Protect the Poor in America and Around the World*, Nov. 18, 2015. <http://www.cornwallalliance.org/2015/11/18/an-invitation-to-christian-college-faculty-to-sign-an-open-letter-to-protect-the-poor-in-america-and-around-the-world/> (accessed 11/20/15).

will be important to trace the precursors that led to its development. By looking at the pioneering efforts of environmentally concerned evangelicals, it will be shown that creation care advocates paved the way for a robust statement on climate change to emerge, the *Evangelical Call to Action*. It will also become clear that the opposition against this movement has been driven by a difference in Scriptural interpretation concerning humanity's responsibility towards creation, one that emphasizes dominion over creation care. In contrast, the ECI placed creation care at the forefront of the evangelical consciousness and its impact has been felt in evangelical colleges and universities where students have taken up the banner of combating climate change through the establishment of various grassroots organizations. To chart a path through the history of evangelical environmentalism, it will be necessary to provide some helpful definitions to clarify what exactly is meant by the terms "evangelical" and "climate change."

The term evangelical comes from the Greek noun *euangelion* meaning "good news" or "glad tidings."⁶ The classic definition of evangelical Christianity has been articulated by historian David W. Bebbington in his book *Evangelicalism in Modern Britain*. He describes evangelical religion as maintaining a quadrilateral of priorities which characterizes its practice. The National Association of Evangelicals (NAE) concurs, utilizing Bebbington's description as a way of defining evangelical religious experience. The four characteristic features are as follows:

- 1) Conversionism: the belief that lives need to be transformed through a 'born-again' experience and a lifelong process of following Jesus.
- 2) Activism: the expression and demonstration of the gospel in missionary and social reform efforts.
- 3) Biblicism: a high regard for and obedience to the Bible as the ultimate authority.
- 4) Crucicentrism: a stress on the sacrifice of Jesus Christ on the cross as making possible the redemption of humanity.⁷

⁶R. V. Pierard and Walter E. Elwell. "Evangelicalism" in *Evangelical Dictionary of Theology* 2nd ed. Walter A. Elwell (Grand Rapids, MI: Baker Academic, 2005), 405.

⁷D. W. Bebbington, *Evangelicalism in Modern Britain* (London: 1989), 2-17. Summarized in Mark A. Knoll, *America's God* (New York: Oxford University Press, 2002), 5. See National Association of Evangelicals <http://nae.net/what-is-an-evangelical/> (accessed Nov. 1, 2015).

Each of the four elements condition the religious practices of evangelical Christians, prioritizing their focus on activities such as Bible study, church attendance, faith sharing, missionary efforts and evangelistic services.⁸ While evangelical Christianity is characterized by these distinct sociological identifying features, climate change incorporates a larger scope of consideration.

Climate change can be defined as “long term changes in the average climate of the entire planet.”⁹ Katharine K. Wilkinson in her book *Between God and Green* describes how an international group was established to track the changes in the earth’s climate called the Intergovernmental Panel on Climate Change (IPCC). She states this group “compiles the world’s peer reviewed climate research” every few years to provide a “combined picture of what we know about the problem’s causes, likely impacts, and possible solutions.”¹⁰ She notes that in the IPCC’s fourth assessment report in 2007 it stated that “changes in the world’s atmosphere, ice cover, and oceans show unequivocally that the world is warming.”¹¹ The report also said that greenhouse gases produced by human activity are likely the cause of these increases in temperature. Greenhouse gases are made up of carbon emissions resulting from natural processes and human activities such as fossil fuel use, land use including agricultural practices such as slash and burn farming, and industrial processes.¹² Anthropogenic (human caused) emissions increase the Earth’s natural greenhouse gas effect. The earth is equipped to handle a

⁸Pew Research Center, Religion and Public Life, June 22, 2011, <http://www.pewforum.org/2011/06/22/global-survey-beliefs/> (accessed Nov. 20, 2015).

⁹Ben Lowe, *Green Revolution* (Downers Grove, IL: InterVarsity Press, 2009),73.

¹⁰Wilkinson, *Between God and Green*, 6.

¹¹Ibid.

¹²Ibid.

certain amount of carbon through the natural intake of vegetation and absorption by the earth's oceans.

However, negative effects can occur if carbon dioxide levels rise too high. Possible effects include:

widespread ice melt, substantial sea level rise, coastal inundation, shifting patterns of precipitation, more frequent and intense droughts, heat waves and floods, greater storm intensity, ocean acidification, the bleaching of coral reefs, species extinctions, the spread of disease, human displacement, and permanent damage to the global economy.¹³

In October 2015, an article in the *Guardian* revealed that a massive global die off of coral reefs was currently underway due to rising ocean temperatures. It has been predicted that 38% of the world's coral reefs will die off in 2015 due to ocean acidification.¹⁴ In November 2015, videographers in the Arctic Circle of Greenland captured an ice sheet the size of lower Manhattan calving off into the ocean, the largest event of this size ever recorded.¹⁵ The question of "is climate change happening?" becomes harder and harder to justify as the evidence continues to mount. However, some still remain unconvinced.

In 1988 when Dr. James Hansen, climatologist and head of the NASA Goddard Institute for Space Studies, testified before Congress and notified them that global warming was already beginning to happen,¹⁶ it set in motion a series of events that conditioned the reception of climate change for decades to come. Fossil fuel and coal companies realized very quickly that they had much to lose in the conversation around greenhouse gas emissions. That is why as soon as this information was made

¹³Wilkinson, *Between God and Green*, 6.

¹⁴Karl Mathiesen, "World's oceans facing biggest coral die-off in history, scientists warn," *Guardian* October 8, 2015.

¹⁵Eddie Geller, "The longest — and probably largest — proof of our current climate catastrophe ever caught on camera," *Upworthy.com* (accessed Nov. 5, 2015).

¹⁶"Statement of Dr. James Hansen" in *The Global Warming Reader*, ed. Bill McKibben (New York: Penguin Books, 2012), 47-53.

public, corporations began funding what has been described as the “climate denial machine.”¹⁷ In a recent article in the *Guardian* it was revealed that Exxon knew about climate change as far back as 1981, yet it continued to fund climate change denial for more than twenty seven years.¹⁸ Pouring millions of dollars into conservative think tanks, front groups and Astroturf organizations, corporations injected doubt about the science of climate change into public discourse. Astroturf organizations are organizations created for the purpose of disguising industry efforts to look like “spontaneous, popular grassroots’ efforts”¹⁹ in order to anonymously lobby for their views. In giving voice to contrarian scientists by providing them with funding, as well as access to media outlets and Congress,²⁰ oil companies and corporations developed a strategy of obfuscation and deception. While many of the contrarian scientists utilized for these efforts did not publish through the normal avenues of peer reviewed scientific literature, they were given a voice through the publication of climate denial books and conferences created by conservative think tanks. In a study investigating 108 climate denial books published before 2010, 72% had a link to conservative think tanks.²¹ Some of these groups are the same organizations who fought against regulations for mandatory seat belts in cars. It is from these questionable channels of influence that climate change denial seeped into the mainstream.²²

¹⁷Riley E. Dunlap and Aaron M. McCright, “Organized Climate Change Denial,” in *The Oxford Handbook of Climate Change and Society*. (Oxford, United Kingdom.: Oxford University Press, 2015), 144.

¹⁸Suzanne Goldenberg, “Exxon knew of climate change in 1981, email says – but it funded deniers for 27 more years,” *Guardian*. July 8, 2015.

¹⁹Dunlap and McCright, “Organized Climate Change Denial,” 147.

²⁰*Ibid.*

²¹Riley E. Dunlap and Peter J. Jacques, “Climate Change Denial Books and Conservative Think Tanks: Exploring the Connection” *American Behavioral Scientist* 57 (6): 705.

²²*Ibid.*

One individual who has worked with conservative think tanks to help forward his agenda is Dr. E. Calvin Beisner, founder and national spokesperson for the Cornwall Alliance, a major opponent of evangelical environmental efforts. Beisner has worked heavily with the Acton Institute and the Heritage Foundation to forward his cause. Both of these think tanks receive money from Exxon and other corporate interests. Beisner has no problem with these connections since he views them as supporting ideas that they find agreeable and he just so happens to be advocating for a position that falls in line with their interests.²³ Beisner has consistently challenged the science of climate change and has fought his evangelical brethren at every step by advocating for his own views which he makes known through declarations and open letters from the organization. Katharine K. Wilkinson has noted that “If Climate Care can be said to have a primary opponent, Beisner is it.”²⁴ He has accused evangelical environmentalists of holding to an unbiblical view of God and believes the Earth is a robust system that can suppress the destructive effects of human beings.²⁵

The conflict between Beisner and the Evangelical Climate Initiative can be attributed to differing interpretations of the creation accounts in Genesis. Beisner clarifies his position in his book *Where Garden Meets Wilderness* when he describes how Genesis 1:28 discusses how humanity was to *subdue* and *rule* the *earth*, whereas in Genesis 2:15 humanity was to *till* and *keep* the *Garden of Eden*.²⁶ Beisner makes much of these commands and views the Garden of Eden as a literal event in the past. He argues

²³E. Calvin Beisner stated this in an interview with Bill Moyers on Moyer’s program *Is God Green?* on PBS. *Moyers on America*, Season 1 Episode 2, October 2006.

²⁴Wilkinson, 65.

²⁵Cornwall Alliance, *An Evangelical Declaration on Global Warming*, May 1, 2009. <http://www.cornwallalliance.org/2009/05/01/evangelical-declaration-on-global-warming/> (accessed Nov. 4, 2015)

²⁶Beisner places only *earth* and *garden* in italics in the original.

that nature “untouched by human hands is *not* good and *should* be improved”²⁷ because human beings were given the task to cultivate the earth even before the Fall. In his view, this means that transforming the earth or interfering with nature should not be viewed negatively. In fact, he argues that if the Fall had never occurred, the earth would still not be as God had intended it to be without the dominion of people over it.²⁸ As such, Beisner sees a mandate for humanity in the Genesis narratives to subdue and rule the earth, transforming it to meet their needs.²⁹ Beisner’s heavy emphasis on dominion is in stark contrast to the views of environmental Christians who uphold the goodness of creation apart from human development, a sticking point which creates much conflict between the two perspectives.

Climate Change: An Evangelical Call to Action emphasized four key elements in its discussion about climate change. They are:

- 1) Human-Induced Climate Change is real and increasing international instability, which could lead to more security threats to our nation.
- 2) The Consequences of Climate Change Will Be Significant, and Will Hit the Poor the Hardest. 3) Christian Moral Convictions Demand Our Response to the Climate Change Problem.
- 4) The need to act now is urgent. Governments, businesses, churches, and individuals all have a role to play in addressing climate change—starting now.³⁰

Beisner responded to the ECI statement with one from the Cornwall Alliance entitled *An Open Letter to the Signers of ‘Climate Change: An Evangelical Call To Action’ and Others Concerned About Global Warming*. In the document, Beisner rejects the notion that human induced climate change is happening and that we could do anything to reduce even if it were. He also directly appeals to the dominion

²⁷Dr. E. Calvin Beisner, *Where Garden Meets Wilderness* (Grand Rapids, MI: Eerdmans, 1997), 12-13.

²⁸*Ibid.*, 13-4.

²⁹*Ibid.*, 17.

³⁰ “Climate Change: An Evangelical Call to Action,” in *The Global Warming Reader*, ed. Bill McKibben (New York: Penguin Books, 2012), 309-18.

passages from Genesis as an argument for the continued development of the earth.³¹ This informs his rejection of any kind of restrictions on energy consumption since he views such policies as having negative effects on the poor. While the question of climate change continues to be debated, there are theological reasons that drive Beisner's reactions. It is important to understand the role that the dominion model plays in the rejection of policy decisions regarding curbing carbon emissions. The only way one will be able to change the mindset of this segment of society is to provide a more sophisticated articulation of the creation care mandate found in the Genesis narratives. The next section will look at how environmentally concerned evangelicals began to argue for just such a model.

Au Sable is an organization that began in 1979. It was the result of a shared vision among three friends to create a summer camp for youth intended to encourage creation care perspectives through the outdoor experiences of campers in God's creation. Over time, Au Sable Trails Camp for Youth transitioned into the Au Sable Institute for Environmental Studies. It grew to provide a robust variety of field study courses for Christians pursuing environmental science and environmental studies.³² Dr. Calvin DeWitt served faithfully as director of this organization for over twenty five years. It was through cohosting a forum with World Evangelical Fellowship in 1992 on "Evangelicalism and the Environment" that the seeds were planted for what would later become the Evangelical Environmental Network (EEN). Ron Sider, founder of Evangelicals for Social action helped to get this organization off the ground. Their first major initiative was *An Evangelical Declaration on the Care of Creation*, a document that encouraged signers to commit to protect and heal the earth as a part of our responsibility to God. This

³¹Cornwall Alliance, "An Open Letter to the Signers of 'Climate Change: An Evangelical Call To Action' and Others Concerned About Global Warming," July 25, 2006. <http://www.cornwallalliance.org/2006/07/25/an-open-letter-to-the-signers-of-climate-change-an-evangelical-call-to-action-and-others-concerned-about-global-warming-2/> (accessed November 19, 2015).

³²<http://ausable.org/about/history/> (accessed Nov. 4, 2015).

document was successful in achieving over 150 signatures from the evangelical establishment.³³ It was a major success for the Network. However, EEN gained even greater notoriety in 1995-6 when Dr. DeWitt, director of Au Sable and co-founder of EEN, spoke at a press conference on the *Endangered Species Act*. He compared the act to Noah's Ark and accused the congress of trying to sink the ship!³⁴ This challenge gave positive press to the organization and gained the attention of the National Association of Evangelicals.

Katharine K. Wilkinson describes how in 2002 Au Sable joined with UK-based John Ray Initiative to host Climate Forum 2002 at Oxford University. She relays how a conversation had between Richard Cizik, "the public policy guru and head lobbyist for the National Association of Evangelicals"³⁵ and Sir John Houghton, chairman of the scientific arm of the Intergovernmental Panel on Climate Change, changed the heart of Richard Cizik towards climate change. Sir John Houghton worked for fourteen years with the IPCC and was a faithful evangelical Christian. In a sincere conversation Sir John Houghton convinced Cizik that our biblical responsibility to care for the environment was not optional and that the impact of climate change would be great. He emphasized to Cizik the important role evangelicals could play in addressing these challenges. As a result of this conversation, Cizik experienced what he termed a "conversion" regarding climate change.³⁶ He took the issue back with him across the pond and began the hard work of creating awareness around this issue. Cizik would work tirelessly to bring climate change front and center in the minds of evangelicals in America, in spite of heavy opposition. Luckily for him, the groundwork had already been laid by several of his environmentally conscious peers.

³³Katharine K. Wilkinson, "Between God and Green," 19-20.

³⁴Ibid.

³⁵Ibid.

³⁶Ibid., 9.

Developing out of the UK conference, the Sandy Cove Conference was held in Chesapeake Bay in 2004. There evangelicals met to discuss climate change concerns in the U.S. It was organized by EEN, Christianity Today and the National Association of Evangelicals. As a result of discussion, participants committed to reach a consensus on climate change in twelve months' time.³⁷ Developing out of the bond of that commitment, the Evangelical Climate Initiative came to fruition. With eighty-six initial signers to the document including Duane Litfin, the president of Wheaton College, Leith Anderson, former president of the National Association of Evangelicals and Rick Warren, evangelical megachurch pastor of Saddleback Church, the tireless efforts of environmentally concerned Christians were finally realized.³⁸ This great achievement brought together a diversity of evangelical leaders on the issue of climate change, firmly establishing it in the consciousness of the evangelical movement.

Evidence for the success of the ECI is manifest in the grassroots efforts of young evangelicals who have taken up the charge to care for the environment. Young Evangelicals for Climate Action was a group formed by a core of young evangelical students and professionals in 2012 at a planning retreat convened by the Evangelical Environmental Network. It seeks to mobilize young evangelicals to take action to overcome the climate crisis as part of Christian discipleship and witness. Groups like A Rocha have sprung up on evangelical campuses around the country including Wheaton College where students have recently developed a community garden for those in the area. In 1983, A Rocha trust was established as a UK charity which sought to create a Christian field study center in Portugal to help the local community protect their valuable estuary. It has grown to provide Christian conservationists with field study areas in over twenty countries across five continents. They have also partnered with

³⁷Wilkinson, "Between God and Green," 23.

³⁸Ibid, 25.

evangelical colleges such as Asbury College to provide recycling at Ichthus, a large annual Christian music festival.³⁹

In a recent letter to the National Association of Evangelicals, Young Evangelicals for Climate Change called upon their leaders to affirm the Lausanne Movement's *Cape Town Commitment* which asserted "world poverty and climate change need to be addressed together and with equal urgency."⁴⁰ Almost a year later, in response to their letter, a resolution was passed on October 15, 2015 by the National Association of Evangelicals. The NAE declared their approval of the Lausanne document in *Caring for God's Creation: A Call to Action*. These young evangelicals were successful in moving the NAE to adopt additional elements to their considerations of creation care. Evangelical youth will determine the legacy of the Evangelical Climate Initiative and so far young evangelicals have taken the reins to continue to push for greater efforts to combat climate change. The mission oriented activism of evangelicals is its greatest asset. It is a rich resource from which to enact robust, grassroots movements to address climate change concerns. Evangelical youth will be the drivers of these efforts and they have already begun to show positive changes to combat anthropogenic global warming. This demonstrates that the Evangelical Climate Initiative was successful in putting creation care at the forefront of the evangelical consciousness.

³⁹Ben Lowe, *Green Revolution* (Downers Grove, IL: InterVarsity Press, 2009), 62-3.
<http://www.arocha.org/en/our-history/> (accessed Nov. 4, 2015).

⁴⁰Christopher J. H. Wright, "The Cape Town Commitment: A Confession of Faith and a Call to Action" (Peabody, MA: Hendrickson Publishers, 2011).

An Ethical and Practical Analysis of the Benefits Associated with Compensated Live Organ Donation

Graduate Research Student Symposium Proceedings

By: Jordan Potter

1) Introduction

In a December 2007 bulletin, the World Health Organization (WHO) reported that 66,000 kidney transplants, 21,000 liver transplants, and 6,000 heart transplants occurred globally in 2005.¹¹⁶ In the United States a decade later, the United Network for Organ Sharing (UNOS), the national transplant organization of the United States, reports that over 122,000 Americans are currently on the United States' organ transplant waiting list, and over 101,000 of those individuals comprise the kidney waiting list alone.¹¹⁷ In addition, nearly 16,000 Americans are waiting on a liver transplant, and thousands upon thousands more are waiting for heart, pancreas, lung, and intestine transplants. It is estimated that the organ waiting list is growing by upwards of several thousands of Americans per year.¹¹⁸

These statistics highlight the growing crisis that is the global organ shortage. In virtually every nation around the world, the demand for viable organs for transplantation greatly exceeds the available supply. A potential remedy to this issue is to incentivize live organ donation by providing compensation for live organ donation, and in countries such as Iran, the only country in the world to currently have a legal system of compensated live kidney donation, this has been an effective model of organ donation that has ultimately eliminated their kidney waiting list since 1999.¹¹⁹ In this paper, I analyze the Iranian system of compensated live kidney donation, and I draw out the numerous ethical and practical benefits of Iran's system that are representative of the benefits of regulated systems of compensated organ

¹¹⁶ Yosuke Shimazono, "The State of the International Organ Trade: A Provisional Picture Based on Integration of Available Information," *Bulletin of the World Health Organization* 85(2007): 955.

¹¹⁷ National Kidney Foundation, "Organ Donation and Transplantation Statistics," Accessed October 18, 2015, <https://www.kidney.org/news/newsroom/factsheets/Organ-Donation-and-Transplantation-Stats>.

¹¹⁸ Gary S. Becker and Julio Jorge Elias, "Introducing Incentives in the Market for Live and Cadaveric Organ Donations," *Journal of Economic Perspectives* 21(2007): 4-8.

¹¹⁹ Bagher Larijani, Farzaneh Zahedi, and Eghbal Taheri, "Ethical and Legal Aspects of Organ Transplantation in Iran," *Transplantation Proceedings* 36(2004): 1241-1242.

donation as a whole. The essay first analyzes the Iranian system of compensated live kidney donation and the practical benefits that it exhibits, including erasing organ waiting lists, reducing the prevalence of organ trafficking and transplant tourism, and providing a financial opportunity to poorer individuals. The essay then concludes by analyzing the ethical benefits of compensated organ donation, including promoting individual autonomy, and showing how the ethical principles of principlism, i.e. autonomy, beneficence, non-maleficence, and justice, are consistent with these benefits of compensated organ donation.

2) Iran's System and the Practical Benefits of Compensated Organ Donation

Being the only regulated system of compensated live kidney donation in the world, Iran's system generally receives much attention when it comes to justifying or condemning the act of compensating organ donation. However, several documented practical benefits are generally used to argue for its effectiveness, including erasing the kidney waiting list and reducing the middle men of organ trafficking.¹²⁰

2.1) Iran's System

The Iranian Model of Kidney Transplantation (IMKT) is generally viewed as the best current available system for compensated organ donation in the world. It is ran by the Iranian Patients' Kidney Foundation (IPKF), also known as the Dialysis and Transplant Patients Association (DATPA), who organizes donors and recipients, schedules procedures, and generally organizes and administrates the entire process of live kidney donation throughout Iran.¹²¹ After matching a compatible pair of individuals, the IPKF arranges a meet between the two parties to negotiate the compensation price paid

¹²⁰ Kiarash Aramesh, "A Closer Look at the Iranian Model of Kidney Transplantation," *American Journal of Bioethics* 14(2014): 35-37.

¹²¹ Mitra Mahdavi-Mazdeh, "The Iranian Model of Living Renal Transplantation," *Kidney International* 82, no. 6 (2012): 629.

from the recipient to the donor. In addition to this compensation, the donor also receives compensation from a NGO known as the Charity Foundation for Special Diseases. This compensation is known as a “gift for altruism,” and it includes monetary compensation in addition to a yearlong, free medical insurance.¹²²

The IPKF plays a crucial role in keeping Iran’s kidney donation system safe and free of corruption, because the required presence of these organizations does not allow organ brokers and “middlemen” to cut corners and exploit vulnerable individuals for a profit in the donation process.¹²³ Their role is further strengthened by the fact that the kidney transplants must go through these organizations in transplant centers that are all located in university hospitals, which are strictly monitored by the Ministry of Health and Medical Education. Additionally, only Iranian citizens are allowed to receive kidneys from Iranian donors, with foreign recipients being forced to provide a donor from their own nationality.¹²⁴ To further highlight the importance of these organizations, it wasn’t until the Ministry of Health and the IPKF took over the kidney donation process in the late 1980’s and early 1990’s that any headway was made on making more kidneys readily available for transplantation. Prior to this time, Iran was an unregulated international kidney market, but many donors were scared off by the exploitation, corruption, and unfair treatment that many donors experienced with independent organ brokers generally matching pairs, organizing transplants, and directing payments. Thus, the introduction of strict national regulation into compensated kidney donations helped Iran get rid of the abuses and pitfalls of an unregulated market, while effectively addressing their national kidney transplant needs.¹²⁵

2.2) Organ Waiting Lists, Organ Trafficking, and Financial Aid

¹²² Aramesh, “A Closer Look at the Iranian Model of Kidney Transplantation,” 35-37.

¹²³ Larijani, Zahedi, and Taheri, “Ethical and Legal Aspects of Organ Transplantation in Iran,” 1241-1242.

¹²⁴ Aramesh, “A Closer Look at the Iranian Model of Kidney Transplantation,” 36.

¹²⁵ Sigrid Fry-Revere, “The Truth About Iran,” *The American Journal of Bioethics* 14, no. 10 (2014): 37-38.

Several different benefits have been observed since the implementation of the IMKT. Easily the best and most notable benefit is the total elimination of kidney waiting lists within Iran. From 1988 to 1999, Iran effectively erased its kidney waiting lists with two main methods meant to increase live kidney donations: 1) the adoption of a living unrelated donor program in kidneys in 1988, and 2) the establishment of “rewarded gifting” of governmental financial awards to live kidney donors in 1997.¹²⁶ These measures function as incentives to increase the supply of kidneys to be able to meet the surging demands of viable kidneys for transplantation. Economists Becker and Elias argue that allowing for compensation for live kidney donation is an effective way to increase overall supply numbers and, at the very least, significantly close the gap between supply and demand, because the overall potential supply of viable organs is exceedingly large compared to the relative demand for transplants. Prohibition of compensated live kidney donation then essentially blocks the vast majority of this potential supply without offering any serious and effective alternative.¹²⁷

A second major benefit that has been observed since the implementation of the IMKT is the elimination of the kidney black market, organ trafficking, and transplant tourism within Iran. The *Declaration of Istanbul on Organ Trafficking and Transplant Tourism* defines organ trafficking as:

...the recruitment, transport, transfer, harboring or receipt of living or deceased persons or their organs by means of the threat or use of force or other forms of coercion, of abduction, of fraud, of deception, of the abuse of power or of a position of vulnerability, or of the giving to, or the receiving by, a third party of payments or benefits to achieve the transfer of control over the potential donor, for the purpose of exploitation by the removal of organs for transplantation.¹²⁸

Similarly, transplant tourism is when individuals from one country travel to another country to receive an organ transplant with an organ that was “donated,” or more likely bought, from one of the locals.¹²⁹

Generally, organ trafficking and transplant tourism go hand-in-hand working together, and they are

¹²⁶ Larijani, Zahedi, and Taheri, “Ethical and Legal Aspects of Organ Transplantation in Iran,” 1241-1242.

¹²⁷ Becker and Elias, “Introducing Incentives in the Market,” 8-9.

¹²⁸ *Declaration of Istanbul on Organ Trafficking and Transplant Tourism* (2008), pg. 2.

¹²⁹ Shimazono, “The State of the International Organ Trade,” 956-957.

usually performed by organ brokers or organ brokering agencies who work outside the law to provide organ transplants for individuals willing to pay high prices to have them illegally. Since the IMKT is highly regulated and supervised by the Ministry of Health and Medical Education and the IPKF handles all of the meetings, transactions, and dialogue between the parties, there is no room for organ brokers in this system, and since that makes it easier to attain a kidney transplant and/or compensation for donation through legal means in Iran, the kidney black market in Iran has been totally eliminated. Additionally, as a practice transplant tourism was illegalized in Iran, and only Iranian citizens can receive kidney transplants from Iranian kidneys.¹³⁰ Thus, a strictly regulated and supervised system of compensated organ donation is beneficial to reducing organ trafficking and transplant tourism.

A third benefit of the IMKT is the financial aid that it provides poorer populations in Iran. In 2006, the governmental “gift for altruism” was an amount equating to roughly \$6,000 that was paid directly to the donor from the government. Additionally, there was also the pre-donation negotiated amount of money that was paid directly from the recipient of the kidney to the donor, which was usually equal to or greater than the governmental “gift for altruism.”¹³¹ This is also in addition to the yearlong free medical insurance that is provided by the government alongside the \$6,000 stipend.¹³² For poorer Iranians, then, live kidney donation is a very attractive option that can provide them with significant financial benefits for modest harms, i.e. surgery, recovery time, etc. Thus, where the first benefit of the IMKT was aimed at the recipients of kidneys, this benefit is aimed at the donors themselves, and the financial aid that compensated organ donation brings to potential donors is a significant benefit observed in the IMKT.

3) Ethical Benefits of Compensated Organ Donation

¹³⁰ Aramesh, “A Closer Look at the Iranian Model of Kidney Transplantation,” 36-37.

¹³¹ Tober, Diane M. “Kidneys and Controversies in the Islamic Republic of Iran: The Case of Organ Sale.” *Body & Society* 13, no. 3 (2007): 156.

¹³² Aramesh, “A Closer Look at the Iranian Model of Kidney Transplantation,” 36-37.

In addition to these practical benefits observed in regulated systems of compensated organ donation, there are also ethical benefits associated with compensated organ donation, specifically the promotion of individual autonomy. What's more, all of these benefits, both practical and ethical, are consistent with the concept of principlism – the dominant ethical paradigm in Western bioethics.

3.1) Autonomy

Being one of the four ethical principles of the concept of principlism, autonomy is defined as a concept of self-governance that is free from controlling interferences from others and obstructions on meaningful choice. A person acting autonomously acts with reference to a self-chosen plan without limitations or interference with that plan from other individuals. When one is not acting autonomously, it is due to the individual's incapability of realizing one's self-chosen plans and desires, which arises from some sort of hindrance or obstruction upon the agent's freedom.¹³³ By prohibiting compensated organ donation, individual autonomy and personal freedom is being hindered, and, generally speaking, this hindrance of autonomy mostly affects vulnerable populations, i.e. poorer populations needing financial aid and the population of unhealthy individuals needing transplants. Thus, the prohibition on compensated organ donation is paternalistic and an unjustified violation and hindrance upon personal freedom, and respecting the principle of individual autonomy is both a justification for and a benefit of compensated organ donation.¹³⁴

3.2) Beneficence, Non-Maleficence, Justice

To further corroborate the appropriateness and validity of these benefits of compensated organ donation, it is helpful to highlight the ethical nature of all of these benefits as they relate to the ethical

¹³³ Tom L. Beauchamp, "The 'Four Principles' Approach to Health Care Ethics," In *Principles of Health Care Ethics*, ed. Richard Ashcroft et al. (England: John Wiley & Sons, Ltd, 2007), 4.

¹³⁴ Arthur J. Matas, "The Case for Living Kidney Sales: Rationale, Objections and Concerns," *American Journal of Transplantation* 4, no. 12 (2004): 2009.

principles of principlism. The ethical principles of principlism are autonomy, beneficence, nonmaleficence, and justice. As we've already seen, the principle of autonomy is consistent with the benefits of compensated organ donation, because the promotion of autonomy is in itself a benefit of compensated organ donation. As for the other ethical principles, beneficence is the second principle of principlism, and it is the ethical obligation to do good to and for others. Nonmaleficence is the third principle, and it is the ethical obligation to not harm others. Finally, the last principle is justice, and it is the ethical obligation to treat others fairly.¹³⁵

These benefits of compensated organ donation are consistent with these ethical principles, because the benefits are essentially just practical applications of the ethical principles themselves. For example, the practical benefit of reducing kidney waiting lists is consistent with the ethical principle of beneficence, because this provides much *good* to many patients who would otherwise die waiting for a kidney. Additionally, the act of donating a kidney itself is an act of beneficence, so allowing compensated organ donation would increase acts of beneficence by the thousands. This benefit is also consistent with the principle of justice, because treating people fairly should not be based upon certain biological contingencies of good health and/or non-faulty organs. The same can be said about the benefit of financial aid to poorer populations. John Rawls' theory of justice also seemingly supports this position, because behind the veil of ignorance prohibition of compensated organ donation would not be supported due to people not knowing their particular circumstances and contingencies in the real-world. The biological and social contingencies of good health and wealth are not known behind the veil of ignorance, so reasonable people would not find it fair to prohibit something that disproportionately affects a certain part of the population, especially since it very well could be oneself that it affects.¹³⁶

¹³⁵ David F. Kelly, Gerard Magill, and Henk ten Have, *Contemporary Catholic Healthcare Ethics*, 2nd ed. (Washington DC: Georgetown University Press, 2013), 63-64.

¹³⁶ Tom L. Beauchamp and James F. Childress, *Principles of Biomedical Ethics*. 7th ed. (Oxford: Oxford University Press, 2013), 256-263.

Thus, the ethical obligation to treat others fairly, i.e. the principle of justice, is consistent with the benefits of reducing kidney waiting lists and the financial aid of poorer populations.

Finally, the principle of nonmaleficence is mostly associated with the benefit of reducing organ trafficking. Since organ trafficking brings with it many harms to differing individuals, the benefit of reduction of organ trafficking is then consistent with the ethical mandate to avoid harming others. This is due to a component of the ethical mandate of nonmaleficence that obligates us not only to do no harm, but also to minimize harm or perform the least harmful route possible.¹³⁷ Since it's clear that organ trafficking produces much more harm than a strictly regulated system of compensated organ donation, or at least that a regulated system is much less harmful than an underground kidney black market, the obligations of nonmaleficence suggest that prohibition is therefore uncalled for.

Since nonmaleficence also shares a special, connected relationship with beneficence, some argue that the principle of nonmaleficence is also consistent with the benefits of reducing organ waiting lists and financial aid for poorer individuals, as well. The argument is that prohibition of compensated organ donation brings *harm* to people by blocking them from either receiving a life-saving organ or financial aid over control of your own body. Specifically, the famous bioethicist Robert Veatch makes this argument with regard to the latter concept. He argues that since the goods of life have been systematically denied to the poorest and most vulnerable of our society, it is unethical and unjust to prohibit one of the last financial benefits these families might have, namely compensated organ donation, and harm them further.¹³⁸ Though this could also be considered an argument from the principle of justice, Veatch's main point is that prohibition of compensated organ donation brings *harm* to these individuals by treating them *unfairly*. Thus, clearly these practical benefits are ethical in nature,

¹³⁷ Beauchamp and Childress, *Principles of Biomedical Ethics*, 150-153.

¹³⁸ Robert M. Veatch, "Why Liberals Should Accept Financial Incentives for Organ Procurement," *Kennedy Institute of Ethics Journal* 13(2003): 29-33.

so the many benefits of compensated organ donation are both practically and ethically justifiable methods to solving this problem. At the very least, these practical and ethical benefits of compensated organ donation require a new conversation regarding its prohibition in modern American society, because the current system is broken with no legitimate other option even on the table.

4) Conclusion

To conclude, there are many different practical and ethical benefits associated with compensated organ donation. These benefits range in nature from reducing organ waiting lists and organ trafficking to promoting individual autonomy and financial aid for poorer populations. Though the Iranian system is not perfect and there are several ethical concerns about the concept as a whole, it is hard to imagine these concerns outweighing the major benefits that have been documented under a strictly regulated system of compensated donation. Therefore, it is time to take action and demand that we reconsider the current prohibition on compensated donation. No longer should abstract moral concerns supersede the real practical and ethical benefits that are accessible, useful, and valuable for those who need it most.

Bibliography

Aramesh, Kiarash. "A Closer Look at the Iranian Model of Kidney Transplantation." *American Journal of Bioethics* 14(2014): 35-37.

Beauchamp, Tom L. "The 'Four Principles' Approach to Health Care Ethics." In *Principles of Health Care Ethics*, ed. Richard Ashcroft, Angus Dawson, Heather Draper, and John McMillan, 4. England: John Wiley & Sons, Ltd, 2007.

Beauchamp, Tom L. and James F. Childress. *Principles of Biomedical Ethics*. 7th edition. New York/Oxford: Oxford University Press, 2013.

Becker, Gary S. and Julio Jorge Elias. "Introducing Incentives in the Market for Live and Cadaveric Organ Donations." *Journal of Economic Perspectives* 21, no. 3 (2007): 4-9.

Declaration of Istanbul on Organ Trafficking and Transplant Tourism (2008), pg. 2.

Fry-Revere, Sigrid. "The Truth About Iran." *The American Journal of Bioethics* 14, no. 10 (2014): 37-38.

Garwood, Paul. "Dilemma Over Live-Donor Transplantation." *Bulletin of the World Health Organization* 85, no. 1 (2007): 5-6.

Kelly, David F., Gerard Magill, and Henk ten Have. *Contemporary Catholic Healthcare Ethics*. 2nd ed. Washington DC: Georgetown University Press, 2013.

Larijani, Bagher, Farzaneh Zahedi, and Eghbal Taheri, "Ethical and Legal Aspects of Organ Transplantation in Iran," *Transplantation Proceedings* 36, no. 5 (2004): 1241-1242.

Mahdavi-Mazdeh, Mitra. "The Iranian Model of Living Renal Transplantation." *Kidney International* 82, no. 6 (2012): 629.

Matas, Arthur J.. "The Case for Living Kidney Sales: Rationale, Objections and Concerns." *American Journal of Transplantation* 4, no. 12 (2004): 2009.

National Kidney Foundation, "Organ Donation and Transplantation Statistics," Accessed October 18, 2015, <https://www.kidney.org/news/newsroom/factsheets/Organ-Donation-and-Transplantation-Stats>.

Shimazono, Yosuke. "The State of the International Organ Trade: A Provisional Picture Based on Integration of Available Information." *Bulletin of the World Health Organization* 85, no. 12 (2007): 955-957.

Tober, Diane M. "Kidneys and Controversies in the Islamic Republic of Iran: The Case of Organ Sale." *Body & Society* 13, no. 3 (2007): 156.

Veatch, Robert M. "Why Liberal Should Accept Financial Incentives for Organ Procurement." *Kennedy Institute of Ethics Journal* 13(2003): 29-33.

Evaluation of Liposomal Bupivacaine in Total Knee Arthroplasty

Lois Schertz

Duquesne University

Introduction

Total knee replacement is a treatment for end stage knee osteoarthritis. According to the Center for Disease Control (CDC) over 100,000 total hip and knee surgeries were performed in 2014 alone (Center for Disease Control, 2015). Unfortunately, pain is an anticipated consequence of total joint arthroplasty surgery. Poor postoperative pain management affects patient outcomes and satisfaction of patients undergoing total joint replacement (Ranawat and Ranawat, 2007). These negative outcomes include increase length of stay in hospitals, and interference with daily living activities. In recent years The Joint Commission (2009) has also placed regulations to improve pain assessment and management for accreditations to be given to hospitals. In order to improve pain management numerous techniques are used to gain effective pain control including multiple medications. Multimodal pain management strategies include administering medications that block the initiation, transmission and reception of pain through the body (Meftah, et al., 2012). Periarticular injections, an injection of local anesthetic into the soft tissue during surgery, are often used as one aspect of a multimodal medication pain control technique. A long acting bupivacaine, a type of periarticular injection, has been introduced and reported to be more effective than prior methods (Lambrechts, O'Brien, Savoie, and Zongbing, 2013). The purposes of this study was to compare the use of periarticular injections using a liposomal bupivacaine as compared to plain bupivacaine in pain control of patients undergoing total joint replacement and analyze the cost effectiveness of implementation.

Methods

Hospital Institutional Review Board (IRB) approval was obtained to compare periarticular injections (PAI) of liposomal bupivacaine versus plain bupivacaine versus control group in a prospective, blinded, randomized trial. All patients undergoing primary total knee arthroplasty (TKA) at our total joint center at Magee Women's Hospital were considered for the study. A total of 80 patients participated in the study between August 18th, 2014 and March second 2015. To be included the patients had to be having primary TKA

and participate in our standard multimodal pain control pathway, which included: spinal anesthetic with intrathecal morphine, oral acetaminophen, cox-2 inhibitor, and pregabalin. Post-operative oral narcotics were still used on an as needed basis. Exclusion criteria included an allergy to bupivacaine or patient receiving high dose narcotics pre-operatively. The eighty consecutive patients who met the inclusion criteria were enrolled in the study and randomized to receive either liposomal bupivacaine or plain bupivacaine using a randomization table. Two patients in the liposomal bupivacaine group were excluded from the study due to complications resulting in a second surgery. The first patient had to go into surgery due to drain fragment retention and the second patient had to go into surgery for peri-prosthetic fracture due to a fall. Forty consecutive patients were retrospectively reviewed to serve as a historical control group. No difference was seen in age, body mass index (BMI) or the American society of anesthesiologists (ASA) physical status classification system in the three groups. All patients had a unilateral cemented TKA by one of two surgeons. Patients, floor staff, and therapy were blinded to medication given during surgery.

Postoperatively patients received celecoxib 400mg two times a day, Lyrica 150mg two times a day, and as needed medication of hydrocodone and/or oxycodone. All patients were mobilized by physical therapy on the afternoon of surgery and seen twice daily by physical therapists thereafter. Data was collected up until discharge. Data was analyzed using standard statistical methods and outcomes were compared between the two study groups as well as against the control group. Outcome measures included pain scores, extension and flexion each day, ambulation on postoperative day one and discharge, assistive devices sent home with, location of discharge, antiemetic use, adverse events, elapsed time to first narcotic use and intervals of every 24 hours, as well as total narcotic consumption measured by the daily morphine equivalent dose (MED). Adverse events were categorized as any event in which the patient needed additional interventions during their stay in the hospital. Research collection was blinded until all data was tabulated.

Results:

Both periarticular injection groups consumed fewer narcotics than the control group. However, the least amount of narcotics consumed was seen in the plain bupivacaine group. This group had a MED total of 131 compared to a MED total of 142 and 155 in the liposomal bupivacaine and control groups, respectively. A simple linear regression model was used to investigate differences the total MED usage between groups. The main effect of time on pain medication used is significant, while the main effect for group is not significant. However, the interaction between group and time is significant; the effect of time on pain medication used depends on the group. The plain bupivacaine group was also found to have the longest elapsed time to first narcotic consumption at 664 minutes, compared to the liposomal bupivacaine group at 584 minutes and 463 minutes for the control group. The time to the first narcotic use values are not normally distributed, so nonparametric tests were performed. The overall comparison (using a Kruskal-Wallis test) revealed a significant difference between at least two of the groups. The three pairwise comparisons between groups were carried out using Wilcoxon Rank Sum tests, and those p-values were adjusted for multiple comparisons using a Bonferroni correction. Only Bupivacaine and Control differ significantly in the time to first narcotic use. The liposomal bupivacaine group had significantly less pain at the time of physical therapy at both post-operative day (POD) one and at time of discharge.

Similar to the analysis of pain medication use, a linear mixed-effects model was constructed to investigate differences in pain scores and physical therapy measures (range of motion, flexion, extension, and ambulation) between groups. Group and time (POD1, and discharge), as well as their interaction, were included as fixed effects in the model. A random subject effect was included to account for repeated measures. Pairwise comparisons between groups at each of the two time points were made using t-tests produced by the model fit, and a Bonferroni correction was used to account for

multiple comparisons. The main effects of group and time are significant, while the interaction between the two of them is not a significant effect. Basically, there is a significant time trend and significant difference between groups, but the time trend does not depend on which group an individual is in. At 24 hours, pain scores significantly differ when comparing liposomal bupivacaine to plain bupivacaine, as well as when comparing liposomal bupivacaine to the control. At 48 hours, there are no significant differences between the groups. Group, time, and the interaction between group and time all have significant effects on flexion. At POD one; there are significant differences in flexion between liposomal bupivacaine and the control as well as between plain bupivacaine and the control. No differences are significant at discharge. Group as a main effect does not have a significant effect on extension, while the main effect of time is significant. The interaction between group and time is also significant; the effect of time on extension depends on which group an individual is in. Only time had a significant effect on ambulation, so there are no between-group differences. There was no significant difference found among the three groups with regard to antiemetic use.

Conclusions:

Our study found that periarticular injections, whether liposomal or plain bupivacaine, resulted in decreased pain, less narcotic consumption, and earlier tolerance of physical therapy when compared to historical controls. The liposomal bupivacaine group experienced the least pain at time of physical therapy while the plain bupivacaine group consumed the least amount of narcotics. Multimodal pain management that includes periarticular injections result in improved pain control but the benefit of a long acting liposomal bupivacaine still needs to be researched more.

Similar results have been reported by Bagsby, Ireland, and Meneghini (2014) and Schroer, Diesfeld, LeMarr, Morton, and Reedy. (2015). In Bagsby, et al. (2014) it was suggested that the poor results of the liposomal bupivacaine was the slow release of the medication from the liposomes which could limit how much

bupivacaine was in the surgical site. In Schroer et al. (2015), liposomal bupivacaine was compared to plain bupivacaine and showed no significant difference in pain control.

Studies that have suggested the benefits of liposomal bupivacaine are also questionable study methodology resulting in lack of validity of the conclusions made. The studies in question lacked a control group and just used retrospective comparison of sequential cohorts method. (Barrington et al., 2014) (Lonner, 2014) (Lambrechts et al., 2013). Authors with conflicts of interest by direct funding from manufacturers of liposomal bupivacaine did the research in question increasing the lack of validity (Bramlett et al., 2012) (Barrington et al., 2014) (Lonner, 2014) (Lambrechts et al., 2013). In Bramlett et al. (2012) only studied liposomal bupivacaine and its ability to control pain without comparing it in addition to pain methods used.

There were some limitations to this study included the participation of two different surgeons. This could include a slight variation in surgical technique even though they both use subvastus posterior cruciate ligament (PCL) sacrificing. The surgeons use different joints in patients that could result in variations in pain levels of subjects. While this study was designed to be completely blind it had a hole, as the liposomal bupivacaine is more viscous. The increase in viscosity resulted in increased strength needed to inject the liposomal bupivacaine than the clear bupivacaine. This could have resulted in the administrator and operating room staff awareness of which patient had the liposomal bupivacaine. There was also a statistically significant imbalance in gender between groups but this was not formally investigated.

As health care shifts to a value-based care model the pressure to demonstrate improved outcomes to warrant the increased cost of medication comes into practice (Porter, and Teisberg, 2006). Liposomal bupivacaine with a cost of 285 dollars has not additional benefit over the plain bupivacaine cost a hundredth as much at \$2.80. Consequently, this study showed there was no significant difference by discharge between the long acting liposomal bupivacaine as compared to the plain bupivacaine resulting in the lack of cost

effectiveness of use of liposomal bupivacaine in practice.

References:

- Bagsby, D., Ireland, P., and Meneghini, R. (2014) Liposomal bupivacaine versus traditional periarticular injection for pain control after total knee arthroplasty. *The Journal of Arthroplasty*. 29 (8):1687-90.
- Barrington, J., Halaszynski, T., Sinatra R. Expert working group on anesthesia and orthopedics critical issues in hip and knee replacement arthroplasty (2014). Perioperative pain management in hip and knee replacement surgery. *The American Journal of Orthopedics*. 43 (4 suppl): S1-S16.
- Bramlett, K., Onel, E., Viscusi, E., and Jones, K. (2012) A randomized, double-blind, dose-ranging study comparing wound infiltration of DepoFoam bupivacaine, an extended-release liposomal bupivacaine, to bupivacaine HCL for postsurgical analgesia in total knee arthroplasty. *The Knee*. 19(5): 530-6
- Lambrechts, M., O'Brien, M., Savoie, F., and Zongbing, Y. (2013). Liposomal extended release bupivacaine for postsurgical analgesia. *Patient Prefer Adherence*, 6(7), 885-890.
- Lonner, J. (2014) Role of liposomal bupivacaine in pain management after total joint arthroplasty. *Journal of Surgical Orthopaedic Advances*. 23(1):37-41
- Meftah, M., Wong, A., Nawabi, D., Yun, R., Ranawat A., and Ranawat, C. (2012) Pain management after total knee arthroplasty using a multimodal approach. *Orthopedics* 35:660.
- Porter, M. and Teisberg, E. (2006). *Redefining health care: creating value-based competition on results*. Boston MA: Harvard Business School Press; 2006

Ranawat, A., and Ranawat, C. (2007). Pain management and accelerated rehabilitation for total hip and total knee arthroplasty. *J Arthroplasty* 22(7 Suppl. 3):12.

Schroer, W., Diesfeld, P., LeMarr, A., Morton, D., and Reedy, M. (2015) Does extended-release liposomal bupivacaine better control pain than bupivacaine after total knee arthroplasty (TKA)? A prospective, randomized clinical trial. *The Journal of Arthroplasty*. 30 (9 Suppl) 64-7.

The Center for Disease Control and Prevention (2015). Inpatient surgery. Retrieved November 1, 2015, from <http://www.cdc.gov/nchs/fastats/inpatient-surgery.htm>.

The Joint Commission. (2009). *Accreditation Standard RI.2.160*. Retrieved November 1, 2015, from The Joint Commission website: <http://www.jointcommission.org/standards>

Yuenyongviwat V. Pornrattanamaneewong C, Chinachoti T, et al. (2012) Periarticular injection with bupivacaine for postoperative pain control in total knee replacement: a prospective randomized double-blind controlled trial. *Adv Orthop* 12:2001.

Simultaneous Inhibition of the PI3K/Akt and MEK5/ERK5 Cascades Reduce Proliferation and Migration in Hormonally Diverse Breast Cancer Cell Lines

Thomas D. Wright, Christopher Raybuck, Katheryn Wendekier, and Jane E. Cavanaugh

Division of Pharmaceutical Sciences, Mylan School of Pharmacy, Duquesne University, PA 15282

Introduction

Breast cancer is a heterogeneous disease state with several challenging frontiers. In particular, aberrations in the phosphoinositide-3-kinase (PI3K) and mitogen activated protein kinase (MAPK) pathways have been linked to increased breast cancer proliferation and survival. It has been proposed that these survival characteristics are mediated through crosstalk mechanisms. Furthermore, the crosstalk between pathways causes a compensatory increase in activation of adjacent pathways and ultimately results in cell survival. For example, inhibition of the MEK1/2 pathway leads to compensatory activation of the PI3K/Akt pathway and vice versa. Therefore, dual or simultaneous blockade of the PI3K/Akt/mTOR and RAS/RAF/MEK/ERK pathways is likely to be more effective than individual blockade. The combination inhibition of mTOR1/2 (AZD8055) and MEK1/2 (AZD6244) synergistically inhibited growth of rhabdomyosarcoma *in vitro* and *in vivo* (Renshaw et al. 2013). Combination inhibitors have also been effective in treating resistant colon and melanoma tumors with PI3K mutations. Furthermore, combinations of MEK1/2 inhibition with either mTOR1 or Akt inhibition resulted in a clinically stabilized disease with no additional tumor growth in colon cancer (Shimizu et al. 2012). Promising combinations of PI3K and MEK inhibitors have also been evaluated in phase I clinical trials on breast cancer patients. However, these clinical trials have yet to encompass the MEK5/ERK5 pathway, a fundamental pro-survival pathway that has been shown to modulate breast cancer proliferation. The MEK5/ERK5 pathway is also

implicated in resistant breast cancer. It has been shown that tamoxifen resistant MCF-7 breast cancer cells mediate their survival through the MEK5/ERK5/c-MYC pathway (Antoon et al. 2012).

The goal of this study is to examine the most promising combinations of PI3K/Akt, MEK1/2/ERK1/2, and MEK5/ERK5 inhibitors and their effects on proliferation and migration and may serve a new strategy for targeting resistant in breast cancer cells.

Methods

Cell Culture

MDA-MB-231 triple negative (ATCC HTB-26), MCF-7 estrogen positive (ATCC HTB-22), and BT474 estrogen positive (ATCC HTB-20) breast cancer cells were plated in 10 cm cell culture dishes and maintained in DMEM:F-12 (1:1), 10% Fetal Bovine Serum (Atlanta Biologicals), and 1% Penicillin/Streptomycin (37°C with 5% CO₂). The BT474 were maintained in Hybricare media complete with 10% Fetal Bovine Serum (Atlanta Biologicals), and 1% Penicillin/Streptomycin (37°C with 5% CO₂).

Treatment With PI3K and MEK inhibitors

Cells were trypsinized and counted with a hemacytometer. Cells were plated in 35 mm plates at a density of 5×10^5 /2mL medium per plate. Cells were allowed to attach 24 hours and were serum starved for 24 hours before treatment. Cells were treated with DMSO, LY294002, U0126, and XMD8-92 for 30 minutes (5 uM final concentration). After inhibitor treatment, cells were stimulated with epidermal growth factor (Sigma Aldrich, 100 ng/mL) for 24 hours. Following treatment, the medium was removed via vacuum and the cells were washed with iced 1xPBS. The washings were discarded and 150 uL lysis buffer (1% Triton X-100 buffer containing 20 mM Tris (pH 6.8), 137 mM NaCl, 25 mM beta glycerophosphate, 2 mM NaPPi, 2 mM EDTA, 1 mM Na₃VO₄, 10% glycerol, 5 µg/mL, leupeptin, 5 µg/mL aprotinin, 2 mM benzamidine, 0.5 mM DTT, and 1 mM PMSF) was added

to the plates on ice for 5 minutes. The lysates were then centrifuged at 10,000 rpm for 10 min at 4°C.

Western Blot analysis

Protein content was determined by a Bradford assay and 30ug of protein was loaded on a 8% SDS-PAGE gel. The contents of the gel were transferred to a nitrocellulose membrane. The membrane was washed with 1x PBS for 5 min and then blocked with Casein Blocking buffer for 1 hour.

Primary antibodies were then applied (with 0.2% tween-20): rabbit anti-phospho-ERK1/2 (Cell signaling #9101S), mouse anti-total ERK1/2 (Cell signaling #9107S), rabbit anti-total ERK5 (Cell signaling #3372S), mouse anti-phospho-Akt Ser 473 (Cell signaling #4051S), and rabbit anti-Akt (Cell signaling #9272S). Mouse anti- α -Tubulin was used as a loading control (Cell signaling #3873S). All primary antibodies were incubated overnight at 4°C. Membranes were washed in 1x PBS solution with 0.2% Tween-20. Membranes were then incubated with goat anti-rabbit and goat anti-mouse secondary antibodies for 1 h at room temperature. Membranes were washed once more with 1x PBS solution with 0.2% Tween-20 and scanned on an Odyssey Infrared Imager (LICOR biosciences). Blots were quantified using Image studio lite. Results were analyzed using Graph pad Prism software (La Jolla, CA).

MTT Assay

Subconfluent monolayer MDA-MB-231, MCF-7, and BT474 cells were trypsinized and plated in 96-well plates at a density of 5×10^3 cells/100 uL per well. Cells were allowed to attach overnight. The cells were treated with DMSO, LY294002, U0126, and XMD8-92 at a concentration of 5 uM for 24 hours. After treatment, 10uL MTT was added to each well (0.5 mg/mL final concentration) and the plates were placed in the incubator for 2 hours (5% CO₂ and 37°C). The medium was removed via vacuum and 100 uL DMSO was added to each well. The plate was wrapped in aluminum foil and

incubated at room temperature for 15 minutes to dissolve the MTT-formazan crystals. The absorbance was measured at 570 nm (VICTOR³ 1420 multilabel counter, Perkin Elmer). Five wells were analyzed for each condition, and wells containing medium-MTT only (no cells) and medium-MTT (DMSO+cells) were used as controls.

Scratch assay

Cells were seeded into 12 well plates at a density of 200,000/1 mL and grown to a confluent monolayer. Prior to treatment, cells were serum starved for 24 hours. The media was removed and a wound (scratch) was introduced with a 200 uL pipette tip. Cellular debris were washed away with 1x PBS and the medium was replenished with the treatment (5 uM final concentration). Images were taken at 0 and 24 hours with the EVOS digital inverted fluorescence microscope (magnification x10). The wound closure, at various time points, was quantified with ImageJ software. The 0 hr time point was used as a baseline.

Wound closure: $(\text{border at 24 hr} - \text{border at 0 hr}) / (\text{border at 0 hr}) \times 10$

Results

Triple negative MDA-MB-231 cell line

Treatment with the PI3K inhibitor, LY294002, significantly decreased proliferation (76.94%) and migration (56.67%). Neither U0126 nor XMD8-92 alone decreased proliferation. However, U0126 did significantly decrease migration (71.62%) in the triple negative breast cancer cells. Of the combination inhibitors, only LY294002 and XMD8-92 significantly reduced both proliferation (54.47%) and migration (60.63%). In addition, the decrease in proliferation and migration from the LY294002 and XMD8-92 combination was significantly lower than each inhibitor alone.

For each of the inhibitors, the kinase activity of downstream targets was successfully abolished. In addition, the target pathways were successfully inhibited in the combination treatments.

Estrogen positive MCF-7 cell line

LY294002 and XMD8-92 significantly decreased proliferation whereas, U0126 had no effect (48.93%, 75.78% and 88.71% respectively). Each of the inhibitors reduced migration in single application. However, the most significant reduction in proliferation and migration was elicited by the LY294002 and XMD8-92 combination (48.84% and 8.57% respectively). We were unable to determine if the single administration of LY294002 was more effective than the dual treatment with LY294002 and XMD8-92 because, there was not significant difference between their proliferation and migration data (proliferation: single (48.93%), dual (48.84%); migration: single (29.81%), dual (8.57%)).

For each of the inhibitors, the kinase activity of downstream targets was successfully abolished. In addition, the target pathways were successfully inhibited in the combination treatments.

Triple positive BT474 cell line

The triple positive cells were not sensitive to any of the single inhibitors with respect to proliferation. Treatment with the combinations: LY294002 and U0126 LY294002 and XMD8-92 did significantly reduce proliferation (58.84% and 54.80% respectively). Each single inhibitor and combination of inhibitors decreased migration and in many cases the border became wider than the initial wound.

For each of the inhibitors, the kinase activity of downstream targets was successfully abolished. In addition, the target pathways were successfully inhibited in the combination treatments.

Conclusions

Our results indicate that inhibition of the ERK1/2 pathway led to an increased activation of the PI3K pathway. Interestingly, inhibition of ERK1/2 signaling was not as effective at decreasing breast cancer cell proliferation as inhibition of the PI3K and ERK5 pathways. These data suggest that crosstalk between these kinases occurs, such that inhibition of the ERK1/2 pathways increases PI3K activity. In addition, dual inhibition of

PI3K and ERK5 effectively reduced both proliferation and migration in all three cell lines

whereas, inhibition of ERK1/2 alone or in combination with PI3K or ERK5 blockade,

yielded mixed responses. In conclusion, a combination of PI3K/Akt and MEK5/ERK5

inhibition may prove to be a novel therapeutic approach for treating several types of breast

cancer.

References

Renshaw J, Taylor KR, Bishop R, Valenti M, De Haven Brandon A, Gowan S, Eccles SA, Ruddle RR,

Johnson LD, Raynaud FI, Selfe JL, Thway K, Pietsch T, Pearson AD, Shipley J.

Dual blockade of the PI3K/AKT/mTOR (AZD8055) and RAS/MEK/ERK (AZD6244) pathways synergistically inhibits rhabdomyosarcoma cell growth in vitro and in vivo. *Clin Cancer Res.* 2013 Nov 1;19(21):5940-51 Epub 2013 Aug 5.

Shimizu T1, Tolcher AW, Papadopoulos KP, Beeram M, Rasco DW, Smith LS, Gunn S, Smetzer L,

Mays TA, Kaiser B, Wick MJ, Alvarez C, Cavazos A, Mangold GL, Patnaik A. The clinical effect of the dual-targeting strategy involving PI3K/AKT/mTOR and RAS/MEK/ERK pathways in patients with advanced cancer. *Clin Cancer Res.* 1078-0432. Epub 2012 Jan 19.

Antoon JW, Martin EC, Lai R, Salvo VA, Tang Y, Nitzchke AM, Elliott S, Nam SY, Xiong W,

Rhodes LV, Collins-Burow B, David O, Wang G, Shan B, Beckman B, Nephew K, Burow M. MEK5/ERK5 Signaling Suppresses Estrogen Receptor Expression and Promotes Hormone-Independent Tumorigenesis. *PLOS One* Volume 8 Issue 8 2013 Aug.

ABSTRACTS

1 An N-methylated Tetrapeptide from a Panamanian Cyanobacterium with Antitrypanosomal Activity

Kh Tanvir Ahmed, Kevin J. Tidgewell, Ph.D.

Medicinal Chemistry | Mylan School of Pharmacy

Faculty Advisor: Kevin Tidgewell, Ph.D.

Poster

American trypanosomiasis or Chagas' disease is caused by the protozoan *Trypanosoma cruzi*. It is a vector-borne neglected tropical disease, which is endemic in 21 Latin American countries. At present about 6 to 7 million people are estimated to be infected with this parasite, which imposes a large economic burden in this region where poverty is widespread. Despite being endemic to Latin America, population migration has brought this disease to the USA, Canada, Europe and Western Pacific countries. There are two stages of the disease, acute and chronic. The chronic phase is more severe, where major organs are invaded by the parasite leading to neurological disorders, intestinal damage, and fatal cardiomyopathy. This phase may appear a decade or more after the initial infection. Effectiveness of available therapeutics is limited by serious side effects, reduced effectiveness in the chronic phase and long term therapy. Lack of significant financial return has resulted in less emphasis on drug discovery programs for antiparasitic agents. Therefore, specific treatments to cure American trypanosomiasis are still inadequate. Recently, we discovered an N-methylated tetra peptide, naranjamide, by bioactivity-guided fractionation from a Panamanian cyanobacterium. A fraction (A2002H) obtained from the cyanobacterial collection showed 75% inhibition of *T. cruzi* in vitro screening. Subsequent purification with HPLC yielded the pure compound, which showed an inhibition of 81.51% of *T. cruzi*. Structure elucidation was conducting using NMR and MS/MS. To confirm structure and provide more material for mechanism of action studies, a total synthesis of naranjamide has been conducted. The total synthesis and structure elucidation will be presented.

2 Characterization of a novel pathway for phosphatidylcholine biosynthesis in *Saccharomyces cerevisiae*

Sanket Anaokar, Jana Patton-Vogt, Ph.D., Ida Lager, Sten Stymne

Biological Sciences | Bayer School of Natural and Environmental Sciences

Faculty Advisor: Jana Patton-Vogt, Ph.D.

Poster

Glycerophospholipids (phospholipids) are essential components of biological membranes. Several metabolic diseases like diabetes, cancer and obesity can cause increased or decreased levels of certain phospholipids in cellular membranes. Thus, the maintenance of membrane composition is crucial to cell functioning. Phosphatidylcholine (PC) is the major phospholipid found in all eukaryotic membranes (Carman, 2011; Henry, 2012). The two main pathways by which PC is synthesized are the methylation

pathway and the Kennedy pathway (CDP-DAG pathway) (de Kroon, 2013). However, a novel pathway has been identified in *S. cerevisiae* (Stalberg, 2008) and plants (Lager, 2014). This pathway involves glycerophosphocholine (GroPCho), the product of PC deacylation, as the starting substrate. It is proposed that GroPCho is reacylated to lysophosphatidylcholine (lysoPC) by accepting an acyl chain. This conversion is catalyzed by an enzymatic activity termed as glycerophosphocholine acyltransferase (GPCAT). The lysoPC is then acylated by lysophosphatidylcholine tranferase (LPCT) to form PC (Lager, 2014). Here we report on the identification of the gene encoding GPCAT and the characterization of this novel pathway in *S. cerevisiae*. In vivo metabolic labeling studies were performed in various strain backgrounds in which the established pathways of PC biosynthesis have been altered and the GPCAT gene was either missing or overexpressed. Our results indicate that the GPCAT gene acts as an GPC acyltransferase in vivo and that this novel pathway contributes to PC biosynthesis in the cell.

3 Investigating the Beliefs of Middle Class African American Parents Toward Urban Education

Candice Aston

School Psychology | School of Education

Faculty Advisor: Scott Graves, Ph.D.

Poster

Educational research has consistently demonstrated the underachievement of African American African children in schools across the United States (Hallinan, 2001). African American students that reside in inner-city communities with predominately working class families are at a higher risk for academic failure. Nationally, African American children have the lowest performance on standardized assessments of academic achievement (Schott Foundation for Public Education, 2008). While there are a multitude of studies that discuss the negative outcomes of African American children from low-income communities, the same cannot be said of the availability of studies that document the schooling experiences of middle class African Americans. Studies show that urban schools benefit from an influx of middle class students and parents because of the resources that accompany them. Schools that have a mix of income levels are more likely to be effective. Middle class parents are characterized as being more involved in their child's education and more able to contribute to school activities. There has been a growing trend for middle-class African Americans to reside in suburban towns with predominately Caucasian families. In addition, more middle class African American families are electing to send their children to non-urban schools (Alba, R. D., Logan, J. R., & Stults, B. J.,2000). Currently there is a lack of research that document the specific reasons why middle class African Americans are choosing non-urban schools for their children. This study seeks to uncover the beliefs that middle class African Americans hold towards urban education. In addition, this study aims to investigate the factors that affect where they send their children to school. Qualitative data were obtained from a subsample of participants who participated in individual interviews that aimed to explore personal narratives of the participants regarding school choice. Based on qualitative analysis, several critical themes arose regarding beliefs toward urban education.

4 Taxidermy and Dioramas: An Art Alive in Purpose and Potential

Adrienne Berndt

Public History | McNulty College and Graduate School of Liberal Arts

Faculty Advisor: Michael Cahall, Ph.D.

Poster

Taxidermy and dioramas provide more than meets the eye in museums. If museums remain conscious of their past and invest in their future the medium's assets will instead become visible. Examining why they were created and what functions they served reveals the reasons why taxidermy and dioramas remain a prominent fixture to museums worldwide. It also shows the progression of how the visitor views these pieces over time even if the works themselves do not change. Messages, goals, and viewing enjoyment often become lost in scientific and technological advancements. Though advancements, often perpetuated by taxidermists, challenge the use of taxidermy and dioramas in museums they also hold the potential to push the efficacy and impact of the medium further. Exposing taxidermy's role in developing public education of scientific classification, animal behavior and environments, culture's interaction with and place in the environment, school education programs, development of new media in viewing nature, preservation of extinct and endangered animals, conservation, and even national identity would connect the visitor to a more educational, engaging, and enriching experience. Unfortunately these opportunities often lie underutilized within the museum. Taxidermy and dioramas showcase neglect, with their departments increasingly receiving job cuts and limited funding. Ignoring this medium's past not only makes for a disengaging visitor experience but sometimes a detrimental one. Neglected pieces occasionally portray incorrect animal behavior, a trait that with text providing context a museum could easily turn into an educational asset exhibiting scientific advancement. If museums themselves lose interest in the potential of taxidermy and dioramas why make visitors view dead animals, when you can see them live through zoos and film? Applying history reveals that taxidermists helped to pioneer these new mediums and used their craft to supplement them. With history, museums hold the potential to make the dead alive in purpose.

5 Female Juvenile Offenders: Influence of Trauma and Relational Aggression

Cassandra Barbary, Sareska Tomayo, Rebecca Fritsch, Tammy Hughes, Ph.D.

Counseling, Psychology, and Special Education | School of Education

Faculty Advisor: Tammy Hughes, Ph.D.

Poster

In 2011, law enforcement agencies made nearly 1.5 million arrests of people under the age of 18, representing a 31% decrease since 2001 (Office of Juvenile Justice and Delinquency Prevention, (OJJDP, 2013). Interestingly, although the overall arrest rate has decreased for juveniles in the United States, the female arrest rate has increased nearly 66 percent over the past two decades (OJJDP, 2010). Indirect aggression, a form of bullying, has been found to be more common among females than males (Crick & Grotpeter, 1995) and may be an unconsidered contribution to the aggressive acts shown in delinquent girls. Indirect aggression refers to more covert types of bullying, including excluding others from social

activities, damaging others' reputation through spreading rumors or gossiping, and withdrawing friendship as a source of punishment (Crick & Groteper, 1995). An additional obstacle to the treatment of female offenders is the presence of previous traumas, which has been closely linked to both physical/overt aggression as well as indirect aggression. Aggression in female offenders has not been as widely studied as aggression in male offenders (Crain et al., 2005). Aggression treatments for offenders are most commonly designed for use with male populations; therefore, the current study specifically targets female offenders in order to expand the intervention knowledge base. It is imperative for service providers to understand the need for gender-specific treatments for juvenile offenders, as most interventions focus on only overtly aggressive, antisocial, and criminal behaviors for male offenders. Attendees will gain an understanding of the influence of relational aggression and trauma upon female juvenile offenders and learn what services providers can do in order to aid the treatment process for female juvenile offenders.

6 The effect of melatonin upon post-acute withdrawal among males in a residential treatment program (M-PAWS)

Corry Bondi, Ph.D., Paula Witt-Enderby, Ph.D.

Pharmacy Administration | Mylan School of Pharmacy

Faculty Advisor: Vincent Giannetti, Ph.D.

Poster

Substance abuse is a public health crisis that impacts families, communities, as well as contributes to various social problems. The economic burden is high with cost estimates of over \$400 billion in lost productivity, crime and health care with over \$36 billion related to health care costs alone. Individuals in recovery experience post-acute withdrawal symptoms (PAWS) that include anxiety, sleep disturbances, depression, and stress. Because of the symptomatology of post-acute withdrawal, melatonin therapy may be beneficial to those experiencing these symptoms. Previous studies provide evidence that melatonin therapy was beneficial to alleviate anxiety, depressive symptoms, sleep disturbances, and stress. However, no randomized, double-blind, placebo controlled trials using melatonin have been conducted in males who are experiencing PAWS. Orally administered melatonin is well tolerated, has few, if any, adverse effects on liver and renal function and has no abuse potential. Because of its lack of abuse potential, melatonin may be an appealing therapeutic option for individuals in whom conventional hypnotic drugs would be problematic. The goal of this research is to incorporate the addition of melatonin to the current treatment program of males who are in a residential treatment program for drug and alcohol abuse. The purpose of this study is to investigate the effect of 5 mg melatonin given nightly for four weeks on weekly assessed, self-reported anxiety, depressive symptoms, insomnia, and stress using a randomized clinical trial design in males with PAWS who reside in a residential treatment center.

7 Using Genomics to Explore Diversity and Adaptation among Tiger Subspecies

Jennifer Broderick, Sarah Sprauer (Undergraduate), Brian Davis, Ph.D.

Biology | Bayer School of Natural and Environmental Sciences

Faculty Advisor: Jan E. Janecka, Ph.D.

Poster

The tiger (*Panthera tigris*) is an iconic species in need of ex situ and in situ conservation initiatives. Tigers are now extinct in several regions and the remaining populations have been greatly reduced and isolated. However, captive tiger populations are thriving, and are believed to harbor more individuals and diversity than their wild counterparts (Luo et al. 2008). These large captive tiger populations provide an opportunity for understanding genome diversity and evolutionary mechanisms that have shaped this species. We will use these captive populations to compare the genomes of tiger subspecies to identify unique molecular adaptations that may distinguish them and lead to their differences. We are initially focusing this study on the Bengal tiger (*P. t. tigris*), the Amur tiger (*P. t. altaica*), and the Sumatran tiger (*P. t. altaica*). These have been selected because they are among the most phenotypically divergent as well as geographically separated subspecies. In addition, the majority of the zoo population is composed of tigers that belong to one of these three subspecies. To generate genome-wide data, we are performing double digest restriction-site associated DNA sequencing (ddRADSeq) on representative individuals. We are currently optimizing this method for tigers and are sequencing samples on the Illumina platform. Based on previous research, this method will generate genotypes for 20-30,000 loci distributed across all chromosomes. Single nucleotide polymorphisms (SNPs) will be genotyped and we will explore the patterns of variation across the genomes of each subspecies. The divergence (F_{st}) of different linkage groups, stretches of homozygosity, and linkage disequilibrium will be used to detect which genomic regions are likely under selection. We will then use the available tiger genome and annotation to identify candidate genes within those regions that contribute to differences between subspecies and local adaptation.

8 Exploring Home: Urban Women's Experiences in a Ruptured Community

Elizabeth Brown

Psychology | McAnulty College and Graduate School of Liberal Arts

Faculty Advisor: Lori Koelsch, Ph.D.

Poster

Root shock is conceptualized as a “traumatic stress reaction” in response to significant community upheaval (Fullilove, 2004). In the mid-20th century, a predominantly African American section of downtown Pittsburgh, known as the Hill District, was completely demolished in order to clear space for the city’s Civic Arena (Evans, 1943). The demolition was part of broader urban renewal attempts across the country (Deitrick and Ellis, 2004), and it forced the displacement of nearly 8,000 people (Fullilove, 2004). According to Fullilove (2004), a rupture on this scale results in a profound loss of community that is both traumatic and longer-lasting than we may currently understand.

As part of an on-going project in collaboration with FOCUS Pittsburgh, a non-profit organization located in the Hill District, the author worked with semi-structured interview data to explore the role of

community in participant descriptions of meaningful life events. Through analysis employing a feminist research method, the Listening Guide, contrapuntal voices of home and homelessness emerged. The author conceptualizes the “home voice” as representative of a sense of belonging; analysis reveals this in attachment to geographical place, as well as to specific people and God. Of particular interest in this study is the participants’ sense of home and belonging as expressed in relationships and faith. The author includes analysis of “I statements” in the form of poetry, and broader implications for interpersonal and community healing are discussed.

Deitrick, S., & Ellis, C. (2004). New urbanism in the inner city. *Journal of the American Planning Association*, 70(4), 426-442.

Evans, G. (1943). Here is a job for postwar Pittsburgh: Transforming the Hill District. *Greater Pittsburgh*, July-August.

Fullilove, M. (2004). Root shock: How tearing up city neighborhoods hurts America, and what we can do about it. *One World/Ballantine*.

9 Method Development and Optimization for the Combined Analysis of Synthetic Cannabinoids and Designer Cathinones in Urine

Holly Castellano

Chemistry | Bayer School of Natural and Environmental Sciences

Faculty Advisor: Stephanie Wetzel, Ph.D.

Poster

In recent years, synthetic cannabinoids and cathinones have been designed to mimic the intoxicating effects of $\Delta 9$ -tetrahydrocannabinol (THC) and amphetamines, respectively. In order to skirt existing drug laws, non-controlled ingredients are used, and the original chemical structures of current drugs are being modified using analogs or derivatives. These continually changing chemical compositions pose a problem for policymakers, and forensic and analytical scientists, as users are able to attain a “legal high” and avoid detection in standard drug screens. A liquid-liquid extraction (LLE) process was developed and optimized that utilized concentrated hydrochloric acid and potassium hydroxide, and chlorobutane in separate steps to displace the acidic cathinones and basic cannabinoids into the organic phase. A single method of analysis was developed to analyze both cathinones and cannabinoids using Liquid Chromatography-Triple Quadrupole-Mass Spectrometry (LC-QQQ-MS), comparing Atmospheric Pressure Chemical Ionization (APCI) and Electrospray Ionization (ESI) sources. Calibration curves were constructed by plotting the peak area/internal standard peak area versus the concentration for cannabinoids and cathinones using APCI and ESI. APCI cannabinoids (JWH-073) had much higher R² values (0.9464 and 0.9858) than ESI cannabinoids (0.1605 and 0.7784). ESI cathinones (MDPV) had higher R² values (0.7603 and 0.809) than APCI cathinones (0.5955 and 0.6775). The uncertainty values associated with the calibration curves were comparable across both sources. According to the data, LC-APCI-QQQ-MS was more sensitive to cannabinoids and LC-ESI-QQQ-MS was more sensitive to cathinones. Additionally, a

novel LC-QQQ-MS method was able to analyze both cathinones and cannabinoids in the same sample, as a result of the developed LLE method.

10 Teachers' Perceptions and Knowledge of the Bullying Experiences of LGBTQ Students

Suzannah Chatlos, Cassandra Berbary, Latitia Lattanzio

Counseling, Psychology, and Special Education | School of Education

Faculty Advisor: Laura Crothers, D.Ed., NCSP

Poster

In order to determine the level of perceived teacher support experienced by LGBT students, 3,652 middle and high school teachers from 42 school districts in a county in southwestern Pennsylvania were contacted to complete an online survey assessing their perceptions and experiences regarding the bullying of LGBT students. Responses were obtained from 201 teachers who completed the survey, which included questions regarding teachers' perceptions of their schools' climate, student safety, and the frequency to which teachers are made aware of LGBT bullying victimization.

Correlational and inferential statistics suggest that, while teacher supportiveness is generally related to more positive perceptions of the school environment, the relationship between supportiveness and aggression appears complex. Results indicate a significant positive relationship between the teachers' perceptions of the supportiveness of school staff towards students regardless of sexual orientation and those teachers' reports of the frequency of bullying victimization experienced by LGBTQ students. Teachers' perceptions of a higher level of support was associated with higher reported frequencies of students' use of derogatory language about LGBTQ individuals and various types of bullying of LGBTQ students. Teachers with an LGB orientation were found to rate the school staff and students as significantly less supportive of students regardless of their sexual orientation, gender identity, or gender expression in comparison to heterosexual teachers. The relevance of significant results and implications for intervention and education with staff and students will be discussed.

11 Healthcare utilization and costs amongst employed adults with Chronic Obstructive Pulmonary Disease (COPD): a retrospective analysis of the Medical Expenditure Panel Survey

Ankur Dashputre

Pharmacy Administration | Mylan School of Pharmacy

Faculty Advisor: Jordan Covvey, Pharm.D., Ph.D., BCPS

Poster

Chronic obstructive pulmonary disease (COPD) is a progressive lung disease characterized by increasing breathlessness, affecting an estimated 13.7 million individuals in the USA. Although research commonly focuses on older individuals, patients with COPD prior to work retirement may face loss of productivity and significant healthcare utilization costs resulting from their disease. The study objective was to describe the healthcare utilization and costs amongst employed adults with COPD. Employed adults (-18 years) with a self-reported diagnosis of COPD were retrospectively identified from the 2012 Medical Expenditure Panel Survey (MEPS) database and stratified into two separate groups: (1) those who reported no missed work, and (2) those who missed work due to their COPD. Descriptive statistics were

utilized to assess the differences between the groups on demographics, clinical characteristics and healthcare resource utilization. Additionally, healthcare utilization costs (2015 dollars) were quantified for office-based, emergency, inpatient, outpatient, home health visits and prescription medicine use. Analysis was performed using Statistical Analysis System 9.4 software (SAS Institute; Cary, NC). A total of 266 patients were identified from the survey based on the inclusion/exclusion criteria: group 1 (n=124) and, group 2 (n=142). For the unweighted data, there was statistical significance across the groups for gender ($p=0.01$), and income ($p=0.03$). No statistical significance was found between the groups for healthcare utilization and the median healthcare visits. Healthcare costs associated with missed work due to COPD were estimated to be \$1.8 billion with a cost of \$1,271 per person compared to \$0.9 billion (with a cost of \$664 per person) among those who reported no missed work. Absenteeism due to COPD seems to be associated with higher healthcare costs. Use of evidence-based interventions focusing on COPD management may decrease the costs attributable to absenteeism.

12 Exploring differences in seminal plasma proteomes among hominids

Amanda Colvin, Thomas J, Chovanec P, Basu P

Biological Sciences | Bayer School of Natural and Environmental Sciences

Faculty Advisor: Michael Jensen-Seaman, Ph.D.

Poster

Humans (*Homo sapiens*), chimpanzees (*Pan troglodytes*), and gorillas (*Gorilla gorilla*) have differing mating systems with varying levels of sperm competition. Several seminal plasma genes have been claimed to evolve under positive selection and others altered or lost. This study aimed to identify biologically relevant similarities and differences among seminal plasma proteomes in relation to primate mating systems and previous genomic studies. Through 1D and 2D gel analysis the complexity of proteins visually differs among species. Seminal plasma from three individuals of each species were run in triplicate in shotgun liquid chromatography – tandem mass spectrometry (LC-MS/MS); 8,960 peptides were identified across all individuals. Five hundred and twenty-four proteins were identified overall. Only 63 proteins were shared between two or more species. Gorillas have vast intraspecies variation among proteomes. Immunoblot detection of the prostate-specific transglutaminase (TGM4) verified LC/MS-MS and previous genomic studies. Chimpanzees have approximately 7.7 fold higher TGM4 expression than humans, and TGM4 was not detected in gorilla, supporting possible pseudogenization. The structural protein SEMG2 was detected in one of three gorilla individuals through immunoblot detection, and in all three human and chimpanzee individuals. Overall, hominid seminal plasma proteomes differ greatly, which may be related to differences in sperm competition and support previous genomic study predictions.

13 Examining Service and Educational Needs of Chinese Families with a Child with Autism: Parents' Perspectives

Xiaohan Chen

Ph.D. Special Education | School of Education

Faculty Advisor: Ann X. Huang, Ph.D.

Poster

Statement of the Research Questions

This study is proposed to answer the following two research questions:

1. What are the Chinese parents' needs in terms of therapeutic services and/or educational supports for their child with ASD?
2. What are the differences in perceived need areas between Chinese parents living in the United States and those who are living in the People's Republic of China?

This study investigates Chinese parents' perspectives on therapeutic services and educational needs of their child on the spectrum, and makes a comparison of needs between parents of children with ASD living in China and those who are living in the United States. We aim to share our insights and findings with service providers and/or educational professionals in the field, so that children with ASD and their families coming from a different cultural background can be understood better and can have better access to the services or supports they really need in school settings or in the community in both countries.

This project will employ an online survey to collect data. The survey will be developed based on the existing research literature. Four need areas are identified and under each need areas there are four items. To collect data in the United States, the survey will be uploaded to www.surveymonkey.com, a professional commercial website designed to administer online surveys and collect anonymous data. It has a secure server with 128 bit encryption. The link to this survey will be distributed via email to our targeted participants, and data (the responses of our participants) will be collected by the website and stored in its database. To collect data in China, a Chinese version of the same survey will be used.

14 Braddock and the Pittsburgh Region

Gina DelGreco

Public History | McNulty College and Graduate School of Liberal Arts

Faculty Advisor: Michael Cahall, Ph.D.

Poster

In 1940 Braddock had a population of 18,326, 70 years later the population was only 2,159 people—a total population decline of more than 90 percent.

Braddock's original industry was steel, and the U.S. Steel owned Edgar Thompson Works, generated jobs for residents of the community. As steel grew, so did businesses, which created a booming local

economy. When steel declined, Braddock did as well—by the year 2000, 2,855 people were living in poverty out of 2,912 people. The residents that could leave, did, opening up opportunities for other towns to create shopping centers and malls, increasing the income gaps between residents in Braddock and the surrounding Pittsburgh area.

The collapse of the steel industry and the supporting businesses partially caused the decline of the borough, but other factors including limited income and a lack of sustainable work as well as a high rate of poverty prevented Braddock's economic success. Jobs left the area, taking away a means of disposable income, creating a larger divide between suburbs and steel towns, and increasing the income gap and the high rate of poverty.

In 1988 Braddock was classified as a “distressed municipality,” to remove this classification Braddock implemented programs such as Braddock Redux, a non-profit group providing sustainable programming to revitalize the area. The Braddock Promise gives graduating high school seniors a chance to attend higher education institutions.

In order to rebound, solutions may include, diversifying markets that are accessible to members of the community, and rebuilding with financial and community support. For Braddock and other steel communities, programs and local support might challenge low poverty and income rates, further benefiting the area. Policy makers cannot plan urban projects without considering how it might affect local and regional residents. Communities should grow with their residents rather than further displace them.

15 Gregorian Chant

Maura Goodwin

Sacred Music | Mary Pappert School of Music

Faculty Advisor: Ann Labounsky, Ph.D.

Poster

This poster project will look at the history of Gregorian Chant and how it has developed through time. It will also look at its modes and how it has influenced modern music as well as how this music is suitable for the Catholic religion.

16 Shoulder Strength Profiles in Those With and Without Scapular Dyskinesia

Daniel Hannah, Jason S Scibek, PhD, LAT, ATC; Chris R Carcia, PhD, PT, SCS, OCS

Rehabilitation Science | Rangos School of Health Sciences

Faculty Advisor: Jason Scibek, PhD, LAT, ATC

Poster

Muscular weakness of the shoulder has been demonstrated in individuals with scapular dyskinesia (SD). The majority of studies have focused on symptomatic patients; however, little is known regarding muscular performance in healthy individuals with SD. The aim of this study was to compare strength measures of the shoulder between healthy individuals with and without SD. Forty healthy, college-aged participants without any history of dominant shoulder pathology were recruited. We elected to conduct

a matched-pairs analysis due to disparity in the number of individuals that presented with SD (27/40) versus those without SD (13/40). Participants were matched based on sex and BMI resulting in 13 matched-pairs. The presence of SD was determined using the scapular dyskinesis test. We utilized the yes/no method to categorize those with and without SD. Strength of the scapula stabilizers and rotator cuff was assessed via manual muscle testing using a handheld dynamometer. Additionally, strength ratios were calculated and analyzed. Differences in strength and strength ratios between those with and without SD were compared using separate two-way mixed ANOVAs with repeated measures with an alpha level of .05. No significant differences ($p > .05$) were observed for the SD group main effect or the interaction between strength and SD. A significant main effect ($p < .01$) was revealed for strength indicating differences between several of the muscles tested. Post-hoc analysis revealed trends that resulted in a generalized order of the muscles from strongest to weakest: upper trapezius, followed by serratus anterior and middle trapezius, lower trapezius, supraspinatus, medial rotators, and lateral rotators. No significant differences ($p > .05$) were observed when comparing strength ratios and SD. Our results indicate that differences in shoulder muscle strength do not exist in healthy subjects with and without SD. Additionally, SD appears to be commonly found in healthy populations.

17 GoodScholar: A Digital Research Assistant for the Web 3.0 Age

Theresa Hoffmann, Ashley Cook, Justin Fanzo

English | McAnulty College and Graduate School of Liberal Arts

Faculty Advisor: James Purdy, Ph.D.

Poster

This project is a sales pitch for GoodScholar, a research assistant app that is a mix between Google Scholar and Goodreads. We believe it would be beneficial for scholars to have an app that could offer them recommendations for research materials using a system akin to Goodreads. Goodreads is great for finding and organizing books for pleasure reading, but is rather ineffective for scholarly research. On the other hand, Google Scholar provides a useful tool for conducting scholarly research, but doesn't offer personalized recommendations for scholars to expand their horizons. It also offers only limited research organization tools. As graduate students attending school in the Web 3.0 age, we feel we have unique insights into the kinds of digital writing tools scholars would like to have access to, and we hope to fill a gap in the market with the proposed app.

This project consists of multiple research components as well as mock-ups of the app itself. In order to understand what digital writing tools are already out there, we examined a few different applications and websites including Goodreads, Google Scholar, Easybib, and Zotero. We conducted a survey of our fellow English Graduate students here at Duquesne to assess what kinds of digital writing tools they currently use and to gauge potential interest in an app like GoodScholar. The mock-ups of GoodScholar consist of wire frames and sample screenshots. Our research led us to formulate an idea for an app that is not exclusively a citation generator or search engine, but an amalgamation of several writing tools that streamline the writing and research process.

18 Scales as Biogeochemical Tags in Tracking Environmental Exposure in Western Pennsylvania Fishes

Laura Howell, Brady Porter, Ph.D.

Biology | Bayer School of Natural and Environmental Sciences

Faculty Advisor: Brady Porter, Ph.D.

Poster

Trace elements incorporated into fish scales have been used to answer questions about the geographic origin and movements of fishes in both freshwater and saltwater environments. Because scales store a record of the elements these fish encounter throughout their lives, scales are a repository of information about aquatic environments. Unlike stable environments, the composition of Pennsylvania stream waters may challenge fishes due to local elemental variability. Such variation can be difficult or costly to qualify. Sources for variation include seasonal effects and both chronic and acute pollution events. Pennsylvania has over 2,300 stream miles that have impacts from abandoned mine discharge (AMD). Use of salts on roads in winter impacts streams through seasonal runoff. In 2008 the initiation of hydraulic fracturing gas extraction in Pennsylvania raised concerns about the possible influx of effluent from drilling sites into waterways. This produced brine may contain unusual elements like strontium and barium at ratios more typical of oceans than freshwater. Here, scanning electron microscopy (SEM) was used to detect changes in elemental composition in fish scales from controlled experiments. Pimephales promelas (fathead minnow) were exposed to road salt, AMD and to ratios of elements to mimic hydraulic fracturing produced water. Their scales were utilized to detect these exposures and evaluate variation in elemental exposure over time. Through this novel application of SEM, we provide a new tool for resource managers to assess the impacts of the influx of pollutants and environmental variability on stream life to include both chronic exposures and pulses of acute exposure.

19 Early Speech Sound Development in Children with Childhood Apraxia of Speech and Other Speech Sound Disorders

Nicole Hill, Molly Dienno, Katherine Romanyshyn, Carly Sommer, Susan Caspari

Speech-Language Pathology | Rangos School of Health Sciences

Faculty Advisor: Megan Overby, Ph. D., CCC-SLP

Poster

Childhood apraxia of speech (CAS) is a pediatric neurological speech sound disorder (SSD) which impairs the motor planning skills for intelligible speech. The condition is genetic and so difficulties with intelligible speech should be manifested in children's early speech sound development. CAS is difficult to diagnose before the age of 2 because there is little research to distinguish it from other SSDs. The purpose of the current single-case study investigation was to compare the early speech sound development (birth to age 2) in children with typical speech sound development (TD), CAS, and non-CAS SSD.

Method: Eight monolingual, White (Non-Hispanic) English-speaking children (ages 3-9) were evaluated with standardized speech-language tests and an adaptation of the Mayo pediatric assessment of speech

motor control. Three children were diagnosed with CAS, three with non-CAS SSD, and two as TD. Parents then volunteered home videos of the participants between birth and age 2.

Vocalizations (6752 total) from the home videos were coded as either nonresonant (not recognizable as English sounds) or resonant (English vowels, consonants, and consonant-vowel sequences transcribable using the International Phonetic Alphabet).

Results: Data were analyzed per minute of video for each participant and averaged by group (CAS, SSD, or TD). Compared to the other two groups, the CAS group produced fewer overall vocalizations during the first two years of life. The average number of resonant consonants/minute was least for the CAS group (.62/minute), followed by the SSD group (2.86/minute), and most for the TD group (4.63/minute). The CAS group also demonstrated the lowest consonant diversity (number of different consonants used/minute). The researchers plan to analyze home videos from an additional four participants to increase statistical power.

Conclusions: Results imply there is a potential for speech-language pathologists to differentially diagnosis children with CAS before the age of 2, but additional investigations are needed.

20 A Characterization of Equine Microflora in Response to a High Carbohydrate Diet: Comparing Fecal and Cecal Samples

Matthew Jevit, Josie Coverdale, Christine Warzecha, Jan Janecka, Ph.D.

Biology | Bayer School of Natural and Environmental Sciences

Faculty Advisor: Jan Janecka, Ph.D.

Poster

Laminitis is a debilitating disease that affects ungulates, most notably horses. It is characterized by the separation of the dermal and the epidermal layer that connect the distal phalanx, and the hoof wall caused by inflammation. Research indicates that introducing a high amount of structural carbohydrates may cause a shift in gut microflora leading to sepsis and body wide inflammation. Traditionally, gut microflora has been characterized by culturing bacterial species from feces. However, it is possible that fecal and cecal samples possess a different bacterial load and may be inappropriate to identify potential pathogenic species in fecal samples. In order to test this hypothesis, 7 quarter horses were randomly divided into two experimental groups. They were given a low amount of commercial high carbohydrate diet (roughly 0.6% of the horse's body weight) or a high carbohydrate diet (1.2% of the horse's body weight). At the end of a 28-day period the experimental groups were given the alternative treatment. Fecal and cecal samples were collected, via a cecal cannulation, on days 1, 2, 3, and 7 of the treatment to track the shift of microflora as the horse's body began to adapt to the treatment. Bacterial species were identified by amplifying a portion of the 16s ribosomal DNA using the Roche 454 flx platform. The instrument produced a mean of 7,288 reads per sample. These were blasted against the GreenGenes database. We found that fecal and cecal samples possess a very different microbial communities. Among the ten most common genera, we found that fecal and cecal samples share no common species. Additionally, we found that fecal samples exhibit a more drastic change in microflora. After the

treatment, fecal samples showed that only two of the most common genera remained in the top ten genera. Cecal samples only exhibited one new genera.

21 Evaluation of outpatient treatment for acute venous thromboembolism (VTE) in patients presenting to an emergency department (ED)

Maeve Kallenbach, Nosarieme Osagiede, Jessica Shupe

Pharmacy | Mylan School of Pharmacy

Faculty Advisor: Molly McGraw, Ph.D.

Poster

Deep vein thrombosis (DVT) management can be done in the outpatient setting, reducing unnecessary hospital admissions. The primary objective of this study was to determine the number of patients diagnosed with DVT in the ED and treated as outpatients. Secondary objectives included: determine the number of patients that could have received outpatient therapy for acute DVT with use of a risk stratification tool, determine the number of patients that could receive treatment with a factor Xa inhibitor, and describe medication prescribing trends for patients diagnosed with acute DVT.

This quality improvement project was conducted via retrospective chart review from January 1, 2014 to January 1, 2015. Patients were included if they were greater than 18 years and had an ultrasound confirmed DVT. Patients were excluded if they had any of the following: pregnancy, recurrent DVT, active or high risk of bleeding, pain requiring intravenous pain medication for greater than 24 hours, concurrent reasons for hospitalization, creatinine clearance less than 30mL/min, known coagulopathy, thrombotic or bleeding disorder, potential for noncompliance, malignancy, severe liver impairment, severe hypertension (greater than 220/greater than 110) or pulmonary embolism. Data was analyzed using descriptive statistics.

Thirty-nine patients met inclusion criteria. Three patients were diagnosed with DVT in the ED and treated as outpatients. According to our risk stratification tool, 15 patients would have been eligible for outpatient treatment. All 15 patients would be appropriate candidates to receive treatment with a factor Xa inhibitor. The most commonly prescribed anticoagulants at the time of discharge included warfarin and rivaroxaban.

In conclusion, 38% of patients diagnosed with DVT in the ED were eligible to receive outpatient treatment with a factor Xa inhibitor. As a result of this quality improvement study, a treatment algorithm will be created to identify appropriate candidates for outpatient therapy with a factor Xa inhibitor.

22 Stripping of the Musical Altars?: The Reformation and the Role of the Organ in Tudor England

Emily Lapisardi

Sacred Music | Mary Pappert School of Music

Faculty Advisor: Ann Labounsky, Ph.D.

Poster

Following Henry VIII's repudiation of the Roman Catholic Faith, the liturgical role of the organ in England was re-evaluated. During the reigns of his two Protestant heirs, Edward VI and Elizabeth I, a decline in organ building and maintenance occurred. However, Elizabeth I was an advocate for the continued liturgical use of the organ in her own chapel, where several of her composers were likely crypto-Catholics. This study explores how the organ was utilized both in the queen's chapel and in ordinary parishes during the Reformation in England.

23 Understanding the role of serotonin receptor subtypes 7 and 2C (5-HT7/2C) in comorbid pain and depression using novel compounds derived from marine cyanobacteria

Neil Lax, Christopher M. Ignatz, Edward J. Hilton, Kh Tanvir Ahmed, Kevin J. Tidgewell, Ph.D., Benedict J. Kolber, Ph.D.

Biology | Bayer School of Natural and Environmental Sciences

Faculty Advisor: Benedict Kolber, Ph.D.

Poster

Chronic pain and major depressive disorder are widespread conditions in the United States. Interestingly, these conditions often occur comorbidly, with each individual disease amplifying the symptoms of the other. Many medications available on the market today for treating pain or depression target G-protein coupled receptors (GPCRs), implying that this class of receptors may be involved in the treatment of the comorbidity of these conditions. Our efforts have sought to characterize two poorly understood GPCRs, the serotonin receptor subtypes 7 and 2C (5-HT7/2C), and the role that they play in comorbid pain and depression. Our approach for targeting these receptors uses compounds isolated from filamentous marine cyanobacteria collected from the Las Perlas Archipelago off of the coast of Panama in the Pacific Ocean. Compounds from this cyanobacterial collection show strong affinity for the 5-HT7 and 2C receptors. These compounds were screened for in vivo activity using a series of pain and depression behavioral assays. Compounds were delivered into male C57Bl/6J mice via intra-cerebroventricular (ICV) cannulas or injections into regions of the brain with high expression of these receptors. Compounds were tested in naïve mice or in mice subjected to a model of comorbid pain and depression, the Spared Nerve Injury (SNI) surgery. SNI surgery involves ligating two of the three branches of the sciatic nerve, the tibial and common peroneal branches, while leaving the third branch, the sural branch, intact. SNI surgery induces mechanical hypersensitivity in the ipsilateral paw (modeling pain) and also induces depression-like behavior. We have found that administration of compounds isolated from marine cyanobacteria induce effects in several standard behavioral assays. Our results suggest that cyanobacteria produce compounds with neural effects that may be useful in understanding pain and depression.

24 Mastery Learning Theory: Assessing the Impact of an Innovative Approach to Educating Nurses to Clinical Competence

Evelyn Lengetti

Nursing | School of Nursing

Faculty Advisor: Rebecca Kronk, Ph.D.

Poster

Purpose: To compare mastery learning to traditional learning when teaching the procedure for inserting an indwelling urinary catheter and the impact on new nurse's competence and self-regulation practices prior to performing this procedure in a simulated environment.

Context: Mastery Learning as an instructional approach posits that all learners have the potential to achieve mastery provided they have the time required for them to learn at their own pace (Bloom, 1968). Self-regulation strategies are actions performed by the learner to gain knowledge and may be simply seeking and organizing information or as complex as rehearsal or getting assistance from others (Zimmerman & Pons, 1986).

Catheter associated Urinary Tract Infections (CaUTI) are one of the most significant patient safety issues today accounting for 30-40 % of all hospital acquired infections annually

(retrieved from <http://www.ihl.org/explore/CAUTI/Pages/default.aspx>) and (www.ihl.org/offering/VirtualPrograms/Expeditions/PreventingCAUTI/Pages/default.aspx). Nosocomial urinary tract infections are also reported as a nursing quality indicator by the American Nursing Association in that nursing care has a direct impact on the "patient's well-being" and clinical outcomes (Rowell & Milholland, 1998). Inconsistencies in practice may contribute to the infection rates. Standardization and adherence to the procedure may improve patient outcomes and reduce cost.

Study Design/Setting/Participants: This study is a longitudinal quantitative experimental research design conducted in an acute care health system. Participants include new to practice Nurse Residents.

Conclusion: The application of these research findings may reveal a new standard for how nurses are educated to attain and maintain competence and improve patient outcomes

25 Formulation of MOMIPP Nanoemulsions with NIR Imaging Properties

Simai Liu, Simai Liu, Mary Kimmel, Michele Herneisey, Lu Liu, Jelena M. Janjic, Ph.D.*

Biotechnology | Bayer School of Natural and Environmental Sciences

Faculty Advisor: Jelena Janjic, Ph.D.

Poster

Glioblastoma multiforme (GBM) is one of the most aggressive brain tumors. The blood brain barrier dramatically hinders traditional chemotherapy due to poor drug targeting efficacy.[1] Therefore, GMB is typically treated by surgical excision, followed by radiotherapy and administration of the DNA alkylating agent temozolomide.[2] Though this approach increases survival rate, it is not a curative treatment. New therapeutic approaches are needed. Unlike chemotherapy, which causes apoptotic cell death,

methuosis is a new form of cell death mechanism driven by vacuolization in the cancer cell cytoplasm.[3] MOMIPP is a novel methuosis-inducing agent developed at the University of Toledo[3] as a potential new treatment for GBM. However, due to its extremely low water solubility, MOMIPP's efficacy in vivo may be limited.[4] The goal of this project was to increase the bioavailability of MOMIPP and thus improve its methuosis-inducing properties. We attempted to improve MOMIPP's bioavailability through the formulation of oil in water nanoemulsions. Our earlier studies showed that synthetic oils such as Miglyol are good carriers for lipid-soluble drugs.[5] In pre-formulation studies, different oil and surfactant combinations were explored and oil/surfactant ratios were optimized to maximize MOMIPP loading into a nanoemulsion. Nanoemulsions were prepared on a microfluidizer and tested for colloidal stability, drug loading, and biological efficacy in a model cell line following earlier reported methods.[6,7] Lipophilic tracer was also added into the nanoemulsions to give them NIR imaging ability. We present here pre-formulation and formulation study results in vitro aimed to improve MOMIPP in vivo anti-tumor efficacy. The study results suggest nanoemulsions demonstrate a strong potential for new anti-tumor drug therapy development.

26 “A Vlog Universally Acknowledged,” a digital analysis of “The Lizzie Bennet Diaries,” a vlog adaptation of Jane Austen’s Pride and Prejudice

Theresa Sullivan, Allison Keene, Maggie Pavlik

English | McAnulty College and Graduate School of Liberal Arts

Faculty Advisor: Jim Purdy, Ph.D.

Oral Presenter and Poster Presenter

When a text is remixed or remediated, the translation can pose fundamental questions about whether that text has changed, or whether the medium is simply a different way to present the same story. This paper will explore the process of remix and remediation as it appears in “The Lizzie Bennet Diaries,” a vlog adaptation of Jane Austen’s *Pride and Prejudice*. To best explore the affordances and constraints of the YouTube medium, we will present our analysis of the vlog in a series of web videos.

We will create five videos for our project. The first is a collaborative vlog that details the differences in plot lines and reading tendencies between the novel and the vlog and describes the major trends in the vlog. Our three individual vlogs highlight aspects of the comparison between text and vlog that we find intriguing. Sullivan looks specifically at how the integrity of Austen’s characters fared the remediation. She then draws conclusions on how the vlog says something new about the ways that cultural norms have changed between Austen’s day and the modern day. Pavlick explores plot changes, showing how the vlog translates these themes powerfully for modern viewers. Keene investigates what it means for the characters of “The Lizzie Bennet Diaries” to be conscious participants in the packaging and dissemination of their lives through online video. The final vlog is a Q&A that answers imaginary questions from viewers about our process of creating the vlog, the affordances and constraints of retelling *Pride and Prejudice* as “The Lizzie Bennet Diaries,” and the place of a vlog like it in the spheres of both digital media and literature.

We believe that this vlog embodies what it means to be a critical consumer of media in an age inundated by digital technology. Ultimately, it proves that remixed and remediated texts capitalize on

the affordances and constraints of their various mediums, but translated versions of the same text, such as “The Lizzie Bennet Diaries” and Pride and Prejudice, can still portray the same fundamental message.

27 Water The Organ

Matthew Lobe

Sacred Music | Mary Pappert School of Music

Faculty Advisor: Ann Labounsky, Ph.D.

Poster

The pipe organ can instill many different conceptual thoughts. To one, it can bring about memories of a baseball game. To another, grandma’s house. Or, the organ can remind someone of a significant occasion in their life, whether it be a wedding or a funeral. But to most, the pipe organ brings our mind to the church. And that is definitely where they are seen and heard the most. However, the origin of the pipe organ as we know it today goes much farther back the Christian church. The original organ goes as far back as Alexandria, Egypt in the 3rd century BCE, which was not used for religious purposes, but for social events and gatherings. This primitive organ, called the hydraulis, was water powered, supplying wind to the pipes through natural sources, such as waterfalls, or a manuel pump. Pipe organs developed over time, but the source of power through water still remained an effective and popular source for hundreds and hundreds of years, even being used here in Pittsburgh with the original organs at the Chapel of the Holy Spirit at Duquesne University and First Lutheran Evangelical Church. The purpose of this presentation is to research the development of the water (hydraulic) organ over time, and the influence it imparted on the modern pipe organ we know today.

28 Effects of combination melatonin, strontium citrate, vitamin D3 and vitamin K2 on osteoblast and osteoclast differentiation grown as co-cultures.

Sifat Maria, Larry Enderby , Holly Lassila , Christine O’Neil , Mark Swanson

Pharmacology | Mylan School of Pharmacy

Faculty Advisor: Paula Witt-Enderby, Ph.D.

Poster

A translational research study, Melatonin-micronutrients Osteopenia Treatment Study (MOTS), was designed to assess the efficacy of combination natural bone tropic agents: melatonin, strontium citrate, vitamin D3 and vitamin K2 (MSDK) on bone health and quality of life in post-menopausal osteopenia. As part of this study, mechanisms underlying MSDK’s effects on bone-forming osteoblasts and bone-resorbing osteoclasts were evaluated using unique co-culture systems containing human bone marrow stem cells (hMSCs) and human peripheral blood monocytes (hPBMCs). Co-cultures were exposed to vehicle, each component (M, S, D or K) alone or combination (MSDK) in either osteogenic (Os+) or growth medium (Os-) for 21 days. Effects of M, S, D and K either alone or in combination on osteoblast and osteoclast differentiation and activity were measured by alizarin red or TRAP staining, respectively. In transwell co-culture, combination MSDK enhanced osteoblast differentiation and mineralization to the greatest extent vs. Os-/V. Layered co-culture study demonstrated similar patterns of osteoblast induction. Interestingly, osteoblast induction occurred at a greater extent in all Os+ treated culture vs Os-/V, suggesting that cell-to-cell contact was important for modulating osteoblast differentiation. In

both cases, M and S alone showed a significant increase in osteoblast mineralization suggesting the possible contribution of these two agents in bone formation by MSDK treatment. Parallel assessment of the treatment's effect on osteoclast differentiation showed that combination MSDK inhibited osteoclast differentiation to the greatest extent vs Os-/V cells even though exposure to M, S or K alone also inhibited osteoclast differentiation. Measurement of the ratio of RANKL; an osteoclast inducer and OPG; a RANKL decoy receptor in transwell co-culture further revealed the potential underlying root of MSDK's effect, which involved induction of membrane bound OPG: RANKL ratio by MSDK treatment as a result of both increasing membrane bound OPG level and decreasing membrane bound RANKL level.

29 History Of Organs In Pittsburgh

Brendan Lowery

Sacred Music | Mary Pappert School of Music

Faculty Advisor: Ann Labounsky, Ph.D.

Poster

I plan to explore the history of pipe organs in the Pittsburgh Region. I will show research pertaining to the similarities of these organs, what influences went into the building of them, and what builders developed the organs.

30 Analysis of Changes in Water Quality of the Allegheny River, Pennsylvania and its tributaries

Emily Mashuda, Beth Dakin, Brady Porter, Ph.D.

Center for Environmental Research and Education | Bayer School of Natural and Environmental Sciences

Faculty Advisor: Brady Porter, Ph.D.

Poster

The Allegheny River supplies water to over one million people in the Pittsburgh area, and yet its use is threatened by our economic and industrial activities. As a part of 3 Rivers QUEST(Quality Useful Environmental Study Teams), a comprehensive water quality monitoring and reporting program, samples were collected biweekly from January 2013 to July 2015 from 14 sites on the Lower Allegheny River and its tributaries. Water temperature, pH, and specific conductance were taken with a multiparameter probe. Grab samples were collected to measure total dissolved solids, alkalinity, several anions (Bromide, Chloride, Sulfate), and several dissolved metals (Magnesium, Calcium, Sodium, Manganese, Aluminum, Iron, Strontium) and were analyzed by a certified lab. Chemical parameters and ratios serve as indicators for specific types of pollution including abandoned mine drainage (AMD), road salt runoff, and produced water from hydraulic fracturing for natural gas extraction. Several of these parameters have established levels for safe drinking water quality.

This study focuses on the Kiskiminetas River (Kiski) and its impacts on the Allegheny River Mainstem. The Kiski is a major tributary for the Allegheny River, resulting from the convergence of the Conemaugh River and Loyalhanna Creek. Historic data was obtained from the EPA and PADEP at comparable sites from 1950 to 1986. Historical levels of sulfate at the Kiski-Vandergrift site ranged from 50 to 500 mg/l (average 249.92mg/l), with some points greatly exceeding this range. By comparison, current levels

observed from 2013-2015 generally ranged from 50 to 200 mg/l (average 118.184mg/l). Levels of dissolved aluminum at the Kiski-Vandergrift site historically ranged from 0.8 to 15.0 mg/l (average 4.85mg/l), drastically higher than the current range from 0.02 to 0.12 mg/l (average 0.056mg/l). Sulfate and aluminum are both associated with AMD, a legacy issue in the Pittsburgh area, and current values reflect lessening effects of this industrial activity.

31 Long-distance transmission of Parkinson's pathology from olfactory structures deep into the central nervous system

Daniel Mason, Negin Nouraei, Jimin Han, Deepti B Pant, Kristin M Miner, Amanda M Gleixner, and Rehana K Leak

Pharmacology | Mylan School of Pharmacy

Faculty Advisor: Rehana Leak, Ph.D.

Poster

Parkinson's patients typically exhibit disruptive non-motor symptoms such as an early loss of smell. The pathological hallmark of this condition is the appearance of Lewy bodies filled with the aggregated α -synuclein protein. Recent studies suggest that synuclein inclusions develop in olfactory structures in the early stages of Parkinson's disease before their appearance in regions associated with motor deficits. Recent studies suggest that synuclein inclusions spread from the posterior brainstem into more anterior structures but that the olfactory pathology is not heavily transmitted to deeper brain structures. However, we hypothesized that synuclein pathology might spread from olfactory structures into areas important for learning and memory, such as the hippocampus and entorhinal cortex, which are known to share anatomical connections with the olfactory bulb (OB). We hypothesized this because the entorhinal cortex and hippocampus are known to develop Lewy pathology at the end stages of Parkinson's disease, when most patients experience cognitive decline. To test this hypothesis, we injected pre-formed synuclein fibrils into the mouse OB and anterior olfactory nucleus (AON), two areas situated immediately above the nasal cavities. As expected, we discovered that synuclein inclusions are able to spread from the original infusion site to the entorhinal cortex and hippocampus, in addition to many other sites known to harbor anatomical connections with the OB/AON. The inclusions in the olfactory structures were labeled with stains specific for amyloid formations and for aggregated synuclein, providing evidence of their Lewy-like nature. Our results are consistent with the view that synuclein pathology can be transmitted from cell to cell and that olfactory pathology is responsible for at least some spread of Lewy pathology into structures essential for learning and memory. In conclusion, we have established a novel model of olfactory pathology with implications for non-motor Parkinson's symptoms such as loss of smell and cognitive dysfunction.

32 Investigation of the role played by the RNA G-quadruplex structure in ALS/FTD pathology

Damian McAninch, Mihailescu, Mihaela Rita

Chemistry and Biochemistry | Bayer School of Natural and Environmental Sciences

Faculty Advisor: Rita Mihailescu, Ph.D.

Poster

Amyotrophic lateral sclerosis (ALS) is a fatal neurodegenerative disorder resulting in motor neuron loss in brain and spinal cord. Frontotemporal dementia (FTD) is one of the most common forms of young onset dementia and second most common form of dementia overall, after Alzheimer's, resulting in degeneration of temporal lobes along with personality changes and language impairment. ALS and FTD are now recognized as members of a broad continuum of neurodegenerative disorders, linked by similar pathology, mechanisms, and overlapping clinical symptoms. Two RNA-binding proteins of interest that link the two diseases are TAR DNA-binding protein 43 (TDP-43) and the fused in sarcoma/translocated in liposarcoma protein (FUS), which are the major protein components in over 90% of ALS and over 50% of FTD inclusions. We hypothesize that the G-quadruplex RNA structure might play an essential role in the pathogenic mechanisms of FUS in ALS and FTD. In this study, the G-quadruplex RNA binding properties of the wild type and C-terminal NLS mutant FUS protein implicated in ALS/FTD will be analyzed.

33 An Examination of Factors Affecting Hemoglobin A1c Levels and Self-Care Behaviors among Type 2 Diabetic Patients in Primary Care Settings

Courtney Proie

Nursing | School of Nursing

Faculty Advisor: Melanie Turk, PhD RN

Poster

The incidence of Type 2 diabetes is increasing at an alarming rate with an estimated 48.3 million people projected to be affected by Type 2 diabetes by 2050. In the U.S., the overall cost of treatment for patients with type 2 diabetes is currently \$174 billion. Current data shows that diabetes has been found to be poorly controlled throughout the United States, and the CCM has been shown to be a beneficial framework for providing care to patients with Type 2 diabetes. This study will examine the effects of the components of the Chronic Care Model on the outcomes of self-care behaviors and HbA1c levels for type 2 diabetes patients in the primary care setting. The results of this study can offer information to improve outcomes and provide a comprehensive assessment of current Type 2 diabetes patients to see where future research efforts need to be focused.

This cross-sectional, descriptive study will examine 8 areas of the CCM related to the management of Type 2 diabetes for patients seen by nurse practitioners and physicians in the primary care setting. A packet of six questionnaires will be given to the participant for their completion. A hemoglobin A1c result will also be obtained from the patient's chart. The SPSS software package version 20.0 will be used to analyze the data using multiple linear regression and ANCOVA analyses.

Currently, there are no studies that have evaluated patient participation levels in decision making and decision support when different practitioners see newly diagnosed type II diabetic patients, nor have

there been any quantitative studies evaluating patient participation scores and their relationship to overall management outcomes. Understanding the relationships among participation, decision support, practitioners, and outcomes can be vital in the future management of newly diagnosed type II diabetic patients.

34 The Rhetoric of Exploitation in International Clinical Research: An Ethical Consideration

Michael Afolabi

Center for Healthcare Ethics | McNulty College and Graduate School of Liberal Arts

Faculty Advisor: Henk ten Have, MD, Ph.D

Both

Exploitation embeds party A taking advantage of B such that A benefits exclusively. Mutually advantageous contexts however involve both parties drawing some benefits, though those of one part may outweigh the other. This paper rejects this standard rendering. It examines the moral undertones of the rhetoric of exploitation in international clinical research. Employing a cost benefit analysis, it argues that if the net gains of A dwarf B's, such a sphere of interaction is not ethically mutually advantageous. While international research in developing economies may provide access to medical care and offer other community benefits such as basic health infrastructures; these benefits are generally short-term in nature, and hardly foster long-term mechanisms to improve individual and collective societal lot. That the summation of benefits in host communities are usually meager compared to the long-term gains of BigPharma and future patients in sponsoring countries further underscores the inadequacy of the rhetoric of mutually beneficial advantages. Against this conceptual backdrop, this paper argues for a fairer approach to sharing the benefits of international research. In this vein, it notes that exigent to a fairer moral calculation is a consideration of the local moral logic as it encounters the global, and a broader consideration of the congeries of interests and intentions of all involved parties.

35 The Spiritual Aesthetic in Solomon Northup's 12 Years a Slave

Alexandra Reznik

English | McNulty College and Graduate School of Liberal Arts

Faculty Advisor: Kathy Glass, Ph.D.

Poster

From Solomon Northup's entrepreneurial position as a violinist in his Saratoga community, to the slaves' "patting" songs he describes on Epps's plantation, to the transcription of "Roaring River: A Refrain of the Red River Plantation" at the end of the text, music permeates his narrative *12 Years a Slave*. Steve McQueen's 2013 film adaptation strategically engages music and sound to more fully represent the realities of slave life. In both the text and film, music becomes the means by which the system of slavery and those who uphold violent oppression come under critique.

The spiritual, an essential musical form to black culture and life, is a powerful mode for slaves to articulate sorrow and resistance with coded language and symbols without being punished. McQueen's film adaptation includes a pivotal scene where Northup, played by Chiwetel Ejiofor, sings the spiritual

“Roll, Jordan, Roll” with the community to mourn the burial of a fellow slave. In this moment, word, music, and the moving image of Northup and the community reveals strong emotionality that directly counters what Erin Dwyer refers to as “affective norms” that sought to control the articulation of sorrow within the chattel system (18). Based on these cultural readings of the spiritual, my paper will analyze scenes in Northup’s narrative where he finds solace in his despair through religion and read them in conversation with the structural contours of the spiritual “Roll, Jordan, Roll” through an intermedial prism. Bringing word, music, and the moving image together illuminates the call-and-response structure of the spiritual that engenders community and, in turn, shapes Northup’s narrative and subjectivity. Northup’s physical and visceral responses to and participation in performing music and singing reveal a nuanced emotionality that resists the “affective norms” to which slaves were held by their masters.

36 Extracellular Recording of Bladder Pain Neurons in the Amygdala

Neal McQUaid

Department of Biological Sciences | Bayer School of Natural and Environmental Sciences

Faculty Advisor: Benedict Kolber, Ph.D.

Poster

The central nucleus of the amygdala (CeA) is known to respond to nociceptive (i.e. noxious) stimuli, making it a potential target for treatment of chronic pain conditions. One such condition, Interstitial cystitis/bladder pain syndrome (IC/BPS), is one of the most common chronic visceral pain conditions affecting 1-2% of Americans, primarily women. IC/BPS causes pelvic pain, increased frequency of urination, nocturia, and, in more than 1/3 of patients, depression. Recently, data suggest lateralized CeA responses to pain including the potential for having functional differences between left and right CeA in the modulation of pain. It is unknown whether similar asymmetry exists for the processing of bladder pain. This study focuses on recording in vivo neuron activation/inhibition of the amygdala in mice using an IC/BPS pain model in order to gain insight into the central mechanisms of bladder pain.

37 Marine Cyanobacterial Secondary Metabolites and their G-Protein Coupled Receptor Binding Abilities

Corinne Staub

Medicinal Chemistry | Mylan School of Pharmacy

Faculty Advisor: Kevin Tidgewell, Ph.D.

Poster

Marine cyanobacteria produce a chemically diverse group of secondary metabolites. These secondary metabolites can be used as pharmacological treatments, including anticancer, antiviral, and antibacterial compounds. This project examines marine cyanobacterial metabolites for G-protein coupled receptor (GPCR) binding. We are specifically interested in compounds with activity at receptors which are linked to central nervous system disorders, such as addiction, pain, and depression. The peripheral benzodiazepine receptor (PBR), renamed as the translocator protein (TSPO), is a receptor found both in the central and peripheral nervous system, with higher levels in the CNS. The receptor is located in the outer mitochondrial membrane, and is linked to inflammation and pain perception due to its expression in leukocytes.¹ The TSPO possesses anxiolytic, anticonvulsant, and hypnotic properties, determined by

benzodiazepine binding studies.² Marine cyanobacteria collected from Panama and Curacao are extracted and fractionated following standard protocol. The samples are sent to the National Institute of Mental Health's Psychoactive Drug Screening Program located at the University of North Carolina Chapel Hill. It has been determined that a number of fractions bind to the TSPO with inhibitory values ranging from 78-92% at 4 mg/mL. The goal of this project is to isolate the active compounds and determine their structure using NMR and LC-MS. Collection and protocol procedures, as well as initial research findings, will be discussed.

38 Unconventional Shale Gas Development in Washington County, Pennsylvania

Colleen Nolan, Tetiana Kondratyuk, Ph.D, John Stolz, Ph.D., Tyler Umstead, Renee Krynock, Scott Mayes
Center for Environmental Research and Education | Bayer School of Natural and Environmental Sciences
Faculty Advisor: John Stolz, Ph.D.

Poster

The recent expansion of unconventional shale gas development (USGD) has brought much debate on the potential benefits and environmental impacts. This study examined ten years of data on gas production in Washington County, Pennsylvania; one of the most productive counties in the commonwealth. It has been argued that the economic benefits and gas well lifetimes have been exaggerated. Public data obtained from the Pennsylvania Department of Environmental Protection (DEP) show gas production peaking within the first three years of well production, with many of the first wells drilled in the county already plugged. This study also addresses the significant amount of natural resources required to support the industry and how the use of these resources may negatively impact the overall environmental health of the region. To address the issue of groundwater contamination, both ground (e.g., water wells) and surface water samples were collected from sources throughout Washington County. Chemical analyses were used to establish a water quality baseline for the county and each sample was compared to the Environmental Protection Agency's (EPA) Maximum Contaminant Levels (MCL) for drinking water standards. A number of homeowners who use groundwater as their drinking water source have seen a deterioration of water quality since USGD began – 38% of survey respondents reported a change in water quality or quantity, including two households who had lost their well during drilling activities. Sixty-seven samples (80%) exceeded the MCL of at least one drinking water standard and 49% of the samples analyzed for light hydrocarbons contained methane.

39 Exploring the communication needs of ICU patients that are mechanically ventilated and spontaneously awakened from sedation: a mini-study

Heather Vitko

Graduate Nursing, PhD | School of Nursing

Faculty Advisor: Richard Zoucha, Ph.D.

Poster

Background and significance: Inability to speak due to the presence of an endotracheal tube is a major source of stress, anxiety, fear, and anger. Current evidence suggests better outcomes are achieved when a patient is minimally sedated while receiving mechanical ventilation, but this often results in patients being more awake. Patients that are intubated and mechanically ventilated are unable to

speak which can lead to anxiety and psycho-emotional distress, resulting in an inability to communicate. There is a gap in the literature that specifically examines the attitudes and lived experiences of patients that are emergently intubated and later awakened from sedation. Patients that are emergently intubated and awakened from sedation may experience added psycho-emotional distress and not be aware of the circumstances surrounding intubation.

Method: A hermeneutic phenomenological mini-study was conducted to explore the lived experiences of patients who are spontaneously awakened while receiving mechanical ventilation. Interviews were conducted with patients that were recently extubated from the ventilator. All were intubated without prior knowledge that they would be unable to speak.

Data was analyzed using a method inspired by Ricoeur and developed by Lindseth and Norberg which involved naïve reading, structural analysis, and comprehensive understanding between two readers. NVivo10 software was used to manage the data.

Findings: When subjects were awakened from sedation, they did not understand why they could not speak, and experienced anger and frustration due to being unable to communicate with the nurse. Themes: Panic and Dreaming. Sub-themes included unawareness of what was happening, fear, non-recollection of certain events, and not understanding why they could not speak.

Discussion and conclusions: The findings of this study provided insight into communication difficulties between patients and their caregivers. Nurses and healthcare providers must be aware of communication needs of mechanically ventilated patients to promote appropriate and holistic care.

40 Proposal to Advance Sexual Assault Program at Genesis Hospital

Katheleen Wallace

DNP | School of Nursing

Faculty Advisor: Betsy Guimond, Ph.D.

Poster

Proposal to Advance the Sexual Assault Program at Genesis Hospital

Katheleen Wallace, MSN, RN, EMTP, EMSI

With each shift, Emergency Department (ED) nurses struggle to incorporate evidence collection, forensic documentation, and forensic photography into their already busy case load. That is where the forensic trained nurse benefits the services provided by the ED.

The purpose of this project is to expand the role of Genesis Hospital Forensic Nurse Examiners beyond the role of the SANE (sexual assault nurse examiner) to provide comprehensive care for victims of violent crimes not previously served. Forensic nursing is far more than another component of emergency room care. It encompasses:

- Providing care to the victims of violence.

- Collecting and documenting evidence.
- Conducting health services for the perpetrators of crime, whether they are suspects in custody, inmates in a correctional setting or offenders placed into custodial care due to incapacitating illness.
- Treating men, women and children who have been assaulted.
- Evaluating and caring for injuries resulting from violence.
- Providing treatment to help prevent sexually transmitted infections that may result from sexual assault.
- Initiating crisis intervention when needed.
- Providing emotional support.
- Arranging medical and psychological follow-up
- Testifying in court.

These duties require a constant need for adaptation and learning. Nurses must go beyond the limits of traditional treatment and fill the much larger role of displaying forensic expertise in the field of healthcare. This project includes ongoing education of Forensic Nurse Examiners and evaluation of program effectiveness, to be supervised by this author.

41 Constructing Neighborhood Identity: Culture and Community in Pittsburgh's Hill District

Megan Patterson

English | McAnulty College and Graduate School of Liberal Arts

Faculty Advisor: Laura Engel, Ph.D.

Poster

My research paper examines the dual narratives of neighborhood identity that defined Pittsburgh's Hill District during the formative years between 1910 and 1950. The neighborhood's identity was forged through the rapid population, demographic and cultural change that took place during this period. As a result of massive population shifts, the neighborhood developed into an ethnic enclave defined by both its substandard, decaying infrastructure and vibrant social and cultural scene. In my research I explore the ways in which the features of infrastructural decay and cultural prosperity are utilized by various groups to create competing visions of the neighborhood's identity. Governmental documents written by entities outside of the community define the area as a blighted space of vice and decay. For example, a 1933 report conducted by the Pittsburgh Housing Association deemed the Hill District "Pittsburgh's greatest liability". It states, "Here is the greatest center of crime and immorality. Here, then, is an area that is ripe and rotten ripe for reconstruction". In contrast, the works of community artists and journalists depict a vision of cultural vibrancy emanating from the site of urban decay. Cultural institutions such as jazz nightspots and the unifying voice of the Pittsburgh Courier newspaper enabled

the neighborhood to establish and project a cohesive local and national identity. The positive images and stories circulated by these texts challenged the imposed narrative of disorder and decay.

I conclude my paper by arguing that discussions of the Hill District's future frequently become inextricably linked with the idea of the neighborhood's cultural past. The vision of the Hill District presented by community redevelopment organizations is a synthesis of the dual identity developed between 1910 and 1950. Organizers construct a narrative of neighborhood identity that both acknowledges the challenges of infrastructural instability and posits a future of continued cultural vibrancy.

42 Predicting Novel Dopamine D3 Receptor Antagonists using Fragment-Based Drug Design

Kendy Pellegrine, Jeffry D. Madura, Ph.D.

Pharmacology | Mylan School of Pharmacy

Faculty Advisor: Christopher Surratt, Ph.D.

Poster

The majority of pharmacotherapeutics used to treat depression yield only partial relief; thus, new medications are necessary to modulate the appropriate signal transduction pathways. Dopamine-mediated brain mesolimbic pathway signaling is related to depressive symptoms, and provides a possible target for future drug therapies. This work in progress will predict dopamine D3 receptor (D3R) antagonists using fragment-based drug design (FBDD). A D3R computational model was first created in MOE using as template the x-ray coordinates of the D3R cocrystallized with the orthosteric antagonist eticlopride (PDB ID: 3PBL). The orthosteric pocket was used to screen ZINC Version 12 library; docking of fragments was performed in MOE. Protein-ligand interaction fingerprints isolated a pool of fragments interacting with the TM 3 Asp110 carboxylate side chain of the pocket. Research as indicated that interaction with this residue is important for monoamine ligand binding. Over 300,000 poses were generated for 64,000 fragments; protein-ligand fingerprints for a third of the poses facilitated sorting of compounds. The MedChem Transformations module of MOE was employed to build selected fragments within the binding pocket. MedChem Transformations were performed on one selected fragment, generating 817 potentially synthesizable compounds. FBDD should facilitate the identification of novel scaffold hit-to-lead compounds with pharmacological profiles that increase therapeutic potential while minimizing the notorious adverse effects of antidepressants.

Funding: NIH/NSF grant R01DA027806

43 Effect of exercise dosing on pain in healthy human subjects

Anna Polaski

Biological Sciences | Bayer School of Natural and Environmental Sciences

Faculty Advisor: Benedict Kolber, Ph.D.

Poster

Chronic pain is a serious problem in the U.S. affecting 116 million adults. Chronic pain presents itself as both an isolated condition, as well as a comorbidity for other health related conditions, such as cancer

and obesity. Although numerous pharmacological interventions exist, few have proven to be effective. Exercise has been proven as an effective treatment in reducing chronic pain. However, the appropriate dose of exercise has yet to be established. The purpose of this study is to determine the minimal dose of exercise required to reduce acute pain in healthy human participants with the goal of translating these results to clinical populations. After screening, healthy participants were randomized into 1 of 3 groups: control (no exercise), low dose exercise (3x/wk), and moderate dose exercise (5x/wk). Over a 7-day period, participants performed 30 minutes of moderate intensity walking on a treadmill during assigned exercise days. Sensitivity thresholds to painful thermal stimulation and painful pressure stimulation were examined. Participants also rated the intensity and unpleasantness of both thermal and pressure pain. Currently, 14 subjects have completed the study and descriptive data have been calculated for 3 subjects per group. Trends are noted in the moderate dose group, with decreases in sensitivity to heat and pressure intensity. The moderate dose group had the greatest reduction in pain sensitivity. This suggests that our lowest dose of exercise is not enough to reduce pain. Overall, the results of this study will have important implications for prescribing exercise to patients.

44 Asymmetrical involvement of the left and right central amygdala in bladder pain

Katelyn Sadler, Allison Trouten, Benedict Kolber, Ph.D.

Biological Sciences | Bayer School of Natural and Environmental Sciences

Faculty Advisor: Benedict Kolber, Ph.D.

Poster

Hemispheric lateralization is a widely recognized theme in neuroscience. First made popular by identification of brain regions like Broca's and Wernicke's areas, asymmetrical involvement of the two hemispheres is now attributed to many different neural processes outside of language cognition. Lateralization is observed in many species from the most basic invertebrates to humans. Recently this phenomenon has been reported in the central amygdala (CeA) during pain processing in rodents. As members of the limbic system, the left and right CeA are well positioned to integrate both affective and sensory information that is generated during chronic pain conditions like interstitial cystitis/bladder pain syndrome (IC/BPS). Our lab has previously demonstrated the importance of the right CeA in bladder pain processing using genetic, pharmacological, and optogenetic techniques, however the involvement of the left CeA in these processes is unknown. In this report, we use optogenetics to activate both the left and right CeA in the context of bladder distension to determine each nucleus's contribution to this specific type of visceral pain. Increases in bladder pain-like responses are observed only during activation of the right CeA; activation of the left CeA has no effect on pain-like responses. Immunohistochemical analysis demonstrates equal cellular activation levels and basal neuron densities between the two nuclei, suggesting that another mechanism must be responsible for the observed physiological asymmetries.

45 Trauma and Learning: Trauma-informed teaching in the schools

Sareska Tamayo, Cassandra Berbary

Special Education, Counseling and School Psychology | School of Education

Faculty Advisor: Tammy Hughes, Ph.D.

Poster

American children are exposed to violence at a shockingly high rate. When taking into account 50 different victimization categories, 57.7% of youth had some exposure to violence, 15.1% had been exposed to six categories, and 4.9% to ten or more categories. Exposure to trauma has a significant negative impact on child learning where children are left in a state of hyperarousal that strongly influence their perceptions and decision making to events other children would find nonthreatening. Consumed by fear and survival responses, children find it difficult to achieve a state of calmness that would allow them to process verbal instructions and learn in class. In addition to learning problems, children can experience feelings of anxiety and depression in addition to acting aggressively.

Schools can address the negative academic, behavioral, and psychological impact of trauma their students' experience by adopting a trauma-informed approach. To mitigate the effects of trauma, faculty and school staff need to understand the impact of trauma on the developing brain, increase their skill at recognizing the signs of trauma symptoms and develop policies, procedures, and setting practices, to actively resist re-traumatization. School practices, guided by trauma-informed care principles, empowers teachers and staff to create supportive learning environments and teach traumatized children to modulate their emotions and gain social and academic competence. Traumatized children have difficulty recognizing emotions so they react impulsively. By helping children identify and articulate their emotions, these children can, in turn, learn to regulate their reactions. Trauma-sensitive schools recognize the need for the child to calm down before guided to identify his/her feelings. Also, because these children come from an environment where power is exercised arbitrarily, discipline methods should avoid coercion and battles for control. The importance of adopting a trauma-informed care in schools, and information regarding trauma-informed care implementation will be discussed.

46 Analysis of a unique, conserved gene system regulating development-associated gene expression for *Streptomyces coelicolor*

Joseph Sallmen, Joseph McCormick, Ph.D.

Biological Sciences | Bayer School of Natural and Environmental Sciences

Faculty Advisor: Joseph McCormick, Ph.D.

Poster

Streptomyces coelicolor is a Gram positive, soil dwelling bacterium that exhibits a complex life cycle, which includes the germination of a single spore into a vegetative mycelium ultimately culminating in the synchronous division of aerial hyphae into unigenomic spores. Early genetic studies identified two classes of genes that resulted in developmental blocks, bald and white. The bald (bld) phenotype occurs when colonies cannot produce aerial hyphae and thus appear to have a smooth, lustrous appearance. White (whi) colonies exhibit incomplete sporulation or loss of production of the concurrently produced grey pigment. While some of the original mutants have been explored, the functions of many of the identified genes are not well understood. Of particular interest is a tripartite system of genes, with multiple homologues of each gene present in *S. coelicolor* chromosome and in other streptomycetes. These three genes encode a predicted helix-turn-helix protein (WhiJ-like proteins), a small, acidic protein of unknown function (BldB-like proteins), and an anti-sigma factor. In order to explore the roles of these

genes in development, one such system involved in the regulation of spore-associated protein (sap) expression was analyzed. sapR and sapS are whiJ and bldB-like genes, respectively, and sasA, a sap anti-sigma factor, are one such tripartite system that may regulate the expression of the sapCED spore-associated protein operon. In order to investigate the potential roles of this gene system, single and double null mutants were isolated using recombineering. Spore-associated proteins were extracted using a nonlethal detergent wash and analyzed on a Coomassie Blue stained SDS-PAGE. Analysis shows an increase in the production of spore-associated proteins in both single mutants and double mutants of sapR and sapS while no such increase was observed in the sasA null mutant, suggesting a role for SapR and SapS in developmentally-associated gene regulation. This was further confirmed by genetic complementation of the sapR and sapS mutants.

47 "The Cost of that Cursed Horse:" Campaign Creatures and Forbes' Expedition

Sarah Weaver

History | McAnulty College and Graduate School of Liberal Arts

Faculty Advisor: Alima Bucciantini, Ph.D.

Poster

This research paper examines the diverse roles animals played in the Forbes' expedition of 1758. Despite transforming the natural and human environment around them in powerful ways, such animals have often been overlooked by historians. Horses, cattle, sheep, oxen and other creatures were fundamentally vital to military ventures of this time, as essential sources of food, transport, and power. This British expedition was the fourth attempt to control the strategically and economically viable Ohio River Valley in the French and Indian War (or Seven Years' War 1754-1763), by capturing Fort Duquesne from the French (situated at the forks of the Ohio River). It was directed by Brigadier General John Forbes and Colonel Henry Bouquet. When building a road across western Pennsylvania to reach their objective, these men faced numerous logistical challenges – the lack of accessible transportation routes, harsh weather, intractably dense forests and high, stony mountains – all encumbered the soldiers' advance and added to the expedition's cost. Animals, as extensions of this natural world, also were agents of change. When applied to the historical record, the unique synthesis of military, environmental, and archaeological theories and methods clearly delineates their decisive position within this expedition. As a food source, campaign creatures diverted a substantial portion of time and resources from the expedition's efficient progress; as a means of transporting not only men, supplies, and military material, but also information and their own food, they engendered conflict between humans which manifested itself in other areas of military importance; their role as targets and weapons also aided (and hindered) the expedition. These functions affirm animals' fundamental significance in human affairs.

48 Construction of a Serotonin Transporter Homology Model from a Eukaryotic Template

Michael Wasko, Christopher Durratt, Ph.D., Jeffry Madura, Ph.D.

Pharmacy | Mylan School of Pharmacy

Faculty Advisor: Christopher Surratt, Ph.D.

Poster

The serotonin transporter (SERT), which promotes reuptake of serotonin from the neuronal synapse, is a key target of current antidepressant drugs including the serotonin-selective reuptake inhibitors (SSRIs). The lack of a SERT crystal structure requires the use of a homology model for in silico studies. Until recently, a crystal structure of the distantly homologous bacterial leucine transporter (LeuT) served as the SERT computational template. Recent advances have yielded crystal structures for closer SERT homologs, and thus are candidates to replace LeuT as a structural template. This work details the construction of a human SERT homology model based on the 2013 *Drosophila* (fruit fly) dopamine transporter structure. The Molecular Operating Environment (MOE) was used to align the amino acid sequences and models were constructed using both MOE and MODELLER. The DOPE scoring function, incorporated in MODELLER, was used to rank the constructed models. The new hSERT model will provide a more accurate ligand binding pocket, which should allow for structure-based methods including fragment-based drug design through fragment screening. It is hoped that the model will afford design of novel-scaffold pharmacotherapies for depression and other serotonin-based CNS disorders.

Funding: NIH/NSF grant R01DA027806

49 Investigation of Water Quality in Proximity to Unconventional Gas Extraction Within and Around Cross Creek County Park, PA

Tyler Umstead, Tetiana Kondratyuk, Ph.D., John Stolz, Ph.D., Colleen Nolan, Linnea Manley, Daniel Robinson

Center for Environmental Research and Education | Bayer School of Natural and Environmental Sciences
Faculty Advisor: John Stolz, Ph.D.

Poster

The combination of horizontal drilling and high volume hydraulic fracturing for unconventional gas extraction has been used extensively in Pennsylvania since 2005. The use of such technology for extracting Marcellus shale gas poses potential risks to surface water and groundwater. The purpose of this study was to assess surface water quality within Cross Creek County Park, Washington County, Pennsylvania and groundwater quality in the surrounding area through residential well water sampling. Currently, seven wellpads containing 25 total unconventional wells are located within the park. A YSI Multi-meter was used to determine water characteristics on site, such as temperature, pressure, DO%, DO (mg/L), pH, conductivity, specific conductivity ($\mu\text{S}/\text{cm}$), and total dissolved solids (mg/L). Water samples were acquired for anion analysis (ion chromatography), cation analysis (ICP-MS, University of Pittsburgh), and dissolved gas analysis (gas chromatography, VaporTech Services, Inc.). All water samples were filtered (0.45 μm) before anion and cation analysis. In addition to water analysis, other environmental aspects were evaluated that included mapping drilling, mining, and land use with ArcGIS software. Data on natural gas production, solid and liquid waste generation, water use, and drilling violations were evaluated as reported by the PA DEP and PA DCNR. Since water sampling began in May, 2015, there have been a number of environmental events within the park that include fish kills, algae blooms, and elevated Fe and Mn concentrations. A trend between some anion (e.g. bromide, fluoride, chloride, and nitrate) levels was detected with respect to lower summer precipitation. Methane was

detected in surface waters, and while this could be from natural sources, the additional detection of ethane and propane could be attributed to unconventional drilling.

50 Efficiency of Placements for Webpage Commercials

Ke Xu, Lin Gu

Journalism and Multimedia Arts | McAnulty College and Graduate School of Liberal Arts

Faculty Advisor: William Gibbs, Ph.D.

Poster

The fast growth of Internet makes human beings nowadays obtain information via screens instead of pages. Advertisements, likewise, appear on web pages more frequently rather than paper mass media. Clicking those commercials on a web page is the most common method to lead the traffic of users to their own website. While the placement of advertisements on a web page becomes vital because it heavily determines whether a commercial would catch the attention of users. In my project, I'm going to research the placement efficiency of advertisements. I am interested in discovering if the placement of advertisements on a web page attracts users' attention or causes users' frustration. This is an important area of research because today commercials or advertisements pervade web pages and yet their actual effects on users vary based on the placement of the advertisement. Therefore, researching the impact of the placement of advertisements would be useful and necessary for advertisers and web developers. This project is premised on theoretical research in visual communication, web design, and user interface design principles. In my project, I'm going to conduct several focus groups during which I will present users a series of designed web pages. The design of these web pages will be based on current, online advertising, and interface design conventions and practices. I will vary the placement of advertisements on each page and ask users to rate their level of frustration, satisfaction, or like/dislike of the web page. Its purpose is to expose me to methods for assessing interfaces, investigating usability issues and reaching the best placement for advertisements on web pages.

Keywords: advertisement, placement, efficiency, visual communication, user interface

51 An Amazon in Streatham Park: The Literary Career of Hester Lynch Thrale Piozzi

Megan Vicarel

History | McAnulty College and Graduate School of Liberal Arts

Faculty Advisor: Holly Mayer, Ph.D.

Poster

Should forgotten women writers be cast as victims, or mavericks? Literary historians have treated Hester Lynch Thrale Piozzi as one or the other—I suggest she may be both.

Mrs. Piozzi (1741-1821), born Hester Lynch Salusbury, was a "woman of quality" among the upper society of London during the late eighteenth and early nineteenth centuries. She married once for convenience and once for love, was esteemed as a gracious hostess as much as a sharp wit to rival the intellectual Bluestockings, and could be both steadfast friend and determined enemy. She penned an invaluable memorial to renowned literary critic Dr. Samuel Johnson, chronicled her Grand Tour in a

memorable travel journal, and was a dedicated diarist and poet. Mrs. Piozzi's love for writing was undeniable. But her professional success—public, published, and paid—further demonstrates a savvy ability to determine when conditions were favorable enough to navigate the predominantly male domain of eighteenth-century literary publishing.

I focus on Mrs. Piozzi's professional career as such in order to demonstrate her agency in choosing when to move from writer to author (and back). Three publications primarily comprise this career, as well as a fourth work that provides an amateur foil to the others. Yet despite these tangible professional successes during her lifetime, Mrs. Piozzi's name—or rather, names—have been obscured almost entirely from the literary canon in ensuing centuries. Furthermore, the argument can be made that her successful publications were only viable around the fame of her male mentor, Dr. Johnson.

Without casting Mrs. Piozzi irrevocably as either a victim of repressive gender roles or as a literary genius with lifelong career ambitions, I demonstrate that her publications resulted from the confluence of circumstance and the tactics she employed, both to take advantage of her opportunities and to overcome her obstacles.

52 Towards Structural and Functional Determination of Human α 1 Glycine Receptor

Rathna Veeramachaneni

Chemistry | Bayer School of Natural and Environmental Sciences

Faculty Advisor: Michael Cascio, Ph.D.

Poster

Glycine receptors (GlyR's) are inhibitory ligand-gated receptors in the nicotinicoid receptor superfamily. GlyR's mediate neurotransmission in CNS and are typically activated by glycine. GlyR is implicated in pain signaling to the brain. In order to better understand the silencing electrical activity of the brain and also the structure and function of GlyR in its open state, ivermectin (IVM) sensitive GlyR channels are developed as IVM is shown to stabilize GlyR in its non-desensitizing state. Double mutant F207A/A288G in α 1 human GlyR has been shown to increase IVM sensitivity and reduce/remove sensitivity for glycine. We are developing photo crosslinking methodologies linked with mass spectrometric analysis on systematically generated single Cys mutations in GlyR with both Cysnull and IVM sensitive backgrounds to enable us to study state-dependent structure of GlyR in a desensitizing and a non-desensitizing manner. Distance constraints obtained from the above studies for the different states of GlyR can be used to update the computational models of GlyR and can help perform comparative studies between the different states of GlyR.

53 Variation in corticosterone in male and female free-living salamanders

Jessica Thomas, Andy M. Magyan, Peter E. Freeman, Sarah K. Woodley

Biological Sciences | Bayer School of Natural and Environmental Sciences

Faculty Advisor: Sarah Woodley, Ph.D.

Poster

Glucocorticoids (GCs) are hormones involved in metabolism that are also released in response to stressors, where they induce numerous behavioral and physiological changes to help the organism cope with the stressor. In many vertebrates, both baseline and stress-induced GCs change on a seasonal basis as well as among individuals. It is hypothesized that this variation is related to various physiological factors including immune function, reproductive investment, and both current and future energetic demands. To better understand the variability of GCs, we measured baseline and stress-induced corticosterone (CORT) in field-caught male and female Allegheny Mountain Dusky salamanders throughout the year and examined several potential predictor variables: sex, neutrophil to lymphocyte (NL) ratio, fat body mass, gonad mass, and body mass. A model that included sex, NL ratio, and their interaction as predictor variables best explained variation in baseline CORT. Specifically, NL ratio was positively correlated with baseline CORT in females but not males. This could be reflective of mating behavior in this species, in which males scratch and release pheromones onto the backs of females. This behavior could make females more susceptible to infection during times of mating, in which case activating the immune system would be beneficial. Differing from baseline CORT, a model that included sex, relative body mass, and their interaction best explained the variation in stress-induced plasma CORT. Specifically, stress-induced plasma CORT was higher in animals with relatively greater body mass, and males had overall higher levels than females. This suggests a link between current energetic maintenance and the magnitude of the GC response to stress. Overall, this study highlights individual variability of GCs and suggests a relationship between plasma GCs, immune investment, and current energetic demands.

54 Technology in the Hands of Students: Using Technology in a Student-Operated Manner to Support Students with Autism

Stephanie Shelpman, Gulnoza Yakubova, Ph.D.
Middle Level Education 4-8 | School of Education
Faculty Advisor: Alexandra Santau, Ph.D.
Poster

Research evidence on the effectiveness of using technology to support children with autism spectrum disorder (ASD) is increasing. Schools are continuously equipped with innovative technology and portable electronic devices, such as electronic interactive whiteboards (IWB), iPads, iPods, and others. Of these devices, IWBs have become a part of almost all classrooms and are mainly used as a large screen presentation device. Yet, IWBs support student learning when they are used in a student-directed manner rather than a traditional teacher-operated manner. This article provides tips for teachers on using IWBs in a student-directed manner to increase students' participation and learning.

55 A search for blood-induced promoters in *Asaia* sp. SF2.1 a midgut symbiont of the *Anopheles vector*

Jackie Shane, David Lampe, Lianna Paul
Biology | Bayer School of Natural and Environmental Sciences
Faculty Advisor: David Lampe, Ph.D.
Poster

Asaia sp. are gram-negative rod shaped bacteria that have been shown to colonize the *Anopheles* mosquito midgut. Species of this mosquito are the main vector for malaria transmission throughout the world. Using a paratransgenic strategy in which transgenically modified symbiotic organisms affect their host's phenotype, *Asaia* has been engineered to secrete anti-malarial effector molecules so that they will be released from the cell into the mosquito midgut, hindering its ability to carry *Plasmodium*. However, the constitutive overexpression of these effectors causes a fitness disadvantage to the *Asaia* strains that carry them. Therefore, it is desirable to express these molecules only when *Plasmodium* is present in the mosquito midgut, namely when a mosquito takes an infected blood-meal. To identify conditional promoters, three techniques are being pursued using the plasmid pGLR1 which has a promoterless dual reporter system with GFP and lux. These include a promoter-trap library, integration of promoters from homologous genes, as well as promoters discovered through RNA-Seq differential gene expression analysis. These promoters were cloned into the plasmid, which were then transformed into the lab strain *Asaia* sp. SF2.1 and plated on iron or heme enriched media. GFP fluorescent colonies were collected and screening is being performed to isolate the promoters that are only induced when iron or heme are present in the media. Furthermore, in-vivo analysis inside mosquitoes is ongoing. This process involves feeding mosquitoes on the transformed bacteria through a sugar meal. The mosquitoes are then separated for blood feeding and both blood-fed and sugar-fed mosquitoes are dissected and the conditional fluorescence of their midguts is evaluated.

56 Genetic analyses of *ftsK* and *ftsK*-like genes for development-associated chromosome segregation in *Streptomyces coelicolor*

Sumedha Sethi

Biological Sciences | Bayer School of Natural and Environmental Sciences

Faculty Advisor: Joseph McCormick, Ph.D.

Poster

Streptomyces coelicolor is a gram-positive soil bacterium with a complex life cycle, which has been used to study development for many decades. During morphological differentiation of *S. coelicolor*, aerial hyphae synchronously divide into chains of unicellular compartments metamorphosing into spores. This synchronous division involves faithful simultaneous segregation of the replicated linear genome into newly formed prespores. Among other segregation and divisome proteins, the DNA translocase FtsK directs chromosome segregation by forming a hexameric ring structure around the DNA at the septa. In addition to *ftsK*, there are two other potential *ftsK*-like genes that have not yet been examined for redundancy of function during development-associated segregation in *S. coelicolor*. The purpose of this study was to construct *ftsK*-like mutant strains using a PCR-directed mutagenesis (recombineering) approach for genetic and phenotypic analyses using DNA staining and fluorescent gene fusions with EGFP to analyze genome segregation and protein localization patterns. Mutants for one gene have been isolated and are currently being characterized. Once verified, double deletion mutant strains for Δ *ftsK* Δ *ftsK*-like deletion will be constructed. Another part of this project was to investigate whether segregation proteins interact with FtsK by employing a bacterial two-hybrid (BACTH) system. To explore potential interaction partners of FtsK, the 3' end of the *ftsK* encoding the cytoplasmic motor domain of FtsK was cloned into BACTH vectors and was analyzed for interactions. Preliminary observations indicate

interaction of FtsK with itself corresponding to the multimerization of its structure and weak interaction with two other segregation proteins ParA and ParJ. Analyses of the roles of FtsK and FtsK-like proteins can further elucidate the complexities of chromosome segregation in this filamentous and sporulating bacterium.

57 A molecular analysis of the mating system of the fantail darter (*Etheostoma flabellare*) in Bates Fork, Greene Co., PA

Ashley Seitz, Beth Dakin

Environmental Science and Management | Bayer School of Natural and Environmental Sciences

Faculty Advisor: Brady Porter, Ph.D.

Poster

In this study, microsatellites were used to gain information concerning the mating system of a population sample of the fantail darter (*Etheostoma flabellare*). The fantail darter has an interesting reproductive strategy; the guarder males claim territory under a flat rock, females select a male and his territory, then flip upside down to deposit eggs on the underside of the rock. The male then fertilizes the eggs and provides all parental care. The goal of this study was to determine an average number of females that contribute to each nest, as well as the frequency of cuckoldry or nest takeover events. In May 2013, we collected egg and adult samples from Bates Fork, Greene Co., PA. DNA was extracted from the samples and a set of three microsatellite loci were used to estimate parental relationships to embryos. The average number of eggs in each nest was 349.4, with a range of 50 – 817 eggs. The average minimum number of females that contributed to each nest was 10.4. In 80% of the nests the guarding male was providing foster care.

58 Cymatics: The Music Within the Water.

Thomas Carraher

Music Technology | Mary Pappert School of Music

Faculty Advisor: Lynn Purse

Oral Presenter and Poster

Cymatics focuses on the interaction of sound waves and vibrations with various responsive mediums (sand/powders, and most commonly water). By channeling vibrations through water incredibly complex geometric patterns begin to appear in even the tiniest spaces.

In my recent experiments I've used a speaker (laying on its back), covered by a metal plate to transmit vibrations from the speaker cone to a bottle cap full of water resting on top. Then using an HD camera and ring light I am able to record and project the visualizations from the water's reaction to the vibration of the speaker. As I play specific tones through the speaker different patterns begin to take shape. Some pulsate while others dance around furiously. The geometry is intricate and beautiful and can be likened to the complexity of the stained glass of Notre Dame Cathedral. Some say the patterns remind them of snowflakes and crystalline or chemical structures. The research is expressing the power vibration has over the arrangement of matter.

Within the coming months I intend to compose music that generates visually stunning arrangements of geometric patterns and project them live in real-time along with the performance of this music. The composition project will shed light on the power of vibration as a primary vehicle of organization in the universe and how participating in music can allow for that same organizational power to take place in our physical bodies.

59 Chronic Toxicity of Crude 4-Methylcyclohexanemethanol to the Crustacean *Ceriodaphnia dubia*

Jacob Keeney, Rachel Wadell

CERE | Bayer School of Natural and Environmental Sciences

Faculty Advisor: John Stolz, Ph.D.

Oral Presenter and Poster

On January 9th, 2014 more than 10,000 gallons of an organic solution contaminated the Elk River in West Virginia, which serves as a water source for over 300,000 residents in the Charleston area. The main constituent of the solution was 4-Methylcyclohexane methanol (MCHM). Prior understanding of crude MCHM'S toxicological effects on aquatic organisms has been limited. In this experiment, chronic toxicity tests were performed using the aquatic microcrustacean *Ceriodaphnia dubia*. Chronic reference toxicant tests using Sodium Chloride were run for quality assurance. Two tests were conducted with MCHM: a range finder test and a narrow range test. No Observed Effect Concentration (NOEC) values were 6.25 mg/L while the Effect Concentration 50% (EC50) was 25 mg/L. These results are consistent with recent studies which used a similar organism (*Daphnia magna*) in acute toxicity tests, but much lower than other tests performed prior to 2014.

60 Pain Nanomedicine: COX-2 Targeted Theranostic Nanoemulsions Redesigned

Lu Liu, Sravan K. Patel, Michele Herneisey and Jelena Janjic, Ph.D.

Pharmaceutics | Mylan School of Pharmacy

Faculty Advisor: Jelena Janjic, Ph.D.

Oral Presenter and Poster

Theranostic nanomedicine is an emerging field that personalizes medical treatment by combining imaging and drug delivery properties into one nanosystem. Macrophages play a central role in acute and chronic inflammation. These cells are highly attractive target for nanomedicine development with the aim of imaging inflammation and improved drug efficacy. (Patel and Janjic, *Theranostics* 2015) Macrophages infiltrate sites of infection and injury, and produce majority of prostaglandins leading to acute and chronic pain. Our lab developed the first inflammatory pain nanomedicine approach that specifically targets COX-2 in infiltrating macrophages. (Patel et al, *Clinical Immunology* 2015, Patel et al *PLOS One* 2013, Janjic et al *SPIE* 2013). Here we present new pain nanomedicine formulations (theranostic nanoemulsions) with significantly increased COX-2 inhibitor drug loading. These novel designs aimed to improve their pain reducing action and improved inflammatory targeting. Nanoemulsions were prepared by microfluidization, scalable process with high level of quality control (Liu et al, *Bioresearch Open* 2015). In this study we present pharmacological evaluation of the new and redesigned pain reducing theranostic nanoemulsions in inflammatory cells, quality assessment data and

evidence for sustained anti-inflammatory effects in vitro related to extended release profile. These novel formulations set the stage for further expansion of nanomedicine into pain research and development of new treatment.

61 Post Traumatic Stress Disorder and Music as Healing

Jason Hoffmann

Musicianship | Mary Pappert School of Music

Faculty Advisor: Zvonimir Nagy, Assistant Professor

Poster

War and specifically post traumatic stress disorder have a devastating effect on soldiers. In my study I investigate the emotional underpinnings of the life of the French composer, professor, ornithologist, and soldier Olivier Messiaen (1908-1992) by looking at the scholarly work that give accounts of his actions. I look at the practices during antiquity as an analytical framework for using art as healing.

Throughout Messiaen's compositional career he included his own transcribed versions of birdsongs in his music. Contemporary scholarship has shown how Messiaen took birdsong and created a musical universe of ornithology, but not much research has been done into understanding the possible reason as to why. Messiaen believed that birdsong, in its very essence, embodied the eternal music of God because birdsongs has remained virtually unchanged over time immemorial. The first piece to completely embrace birdsong was The Blackbird. The Blackbird used conventional form of three sections to explore unconventional tonality, influenced by serialism but not strict serialism, to create the aesthetic of birdsong in music with flute and piano.

Throughout his career birdsongs represented a positive force that sustained him as a composer. The use of birdsong at specific times during Messiaen's career functions similarly to how the ancient Athenians used art, specifically theater, to reintegrate returning combat veterans into civil society. Although Messiaen was not diagnosed with post traumatic stress disorder, my study offers an alternative perspective on his creative process by pointing towards several of the symptoms over the course of his life. The symptoms of PTSD did not debilitate Messiaen's ability to be a successful member of society. It is Messiaen's archetype of using the arts as a method of healing the soul that is seen in my study as an example that could help our own veterans.

62 An Ethical Framework for Communication of Prognosis in Pediatric Critical Care Medicine

Amanda Mattone

Health Care Ethics | McAnulty College and Graduate School of Liberal Arts

Faculty Advisor: Gerard Magill, Ph.D.

Poster

Communication is the most widely used medical tool, yet it often comes with no protocol or guidance for its use. The lack of an ethical communication framework in pediatric medicine is especially problematic as pediatric physicians often experience difficulty having challenging conversations

regarding prognosis. This presentation will discuss the need for an ethical framework for communication of prognosis in the pediatric critical care setting. This presentation will first seek to explain communication theory as it applies to pediatric medicine, next this analysis will explore how communication theory can be enlightened by related bioethics topics, and lastly the discussion will provide an ethical framework for communication of prognosis in the pediatric critical care setting.

63 Numbers and Proportion in Performing Arts: An Exploration of Musical Space in Stravinsky's Agon

Benjamin Meyer

Guitar | Mary Pappert School of Music

Faculty Advisor: Zvonimir Nagy, Ph.D.

Oral Presenter and Poster

Numbers and music share a synergy in which spatial attributes can be created by the interplay of structure, compositional process, and performance. In my study, I consider the consistencies of musical structure and musical space by closely examining the spatial modality of musical language in the twentieth century music. By closely examining the formation of musical structure, orchestration, and choreography, my analytical study thus delves into Stravinsky's compositional process that relates twelve-tone rows to musical space by combining dance movements and numerical proportions in his work *Agon: A Ballet for Twelve Dancers*. Specifically looking at the unfolding of Stravinsky's multimodal spatiality found in the selected movements of *Agon*, I propose an analytical framework in which I explore the reciprocity of music and space. As I examine the relationship of numbers and proportion in Stravinsky's piece as an attribute to the compositional process, I develop a methodology by which a closer look at Stravinsky's work reveals dissecting similarities and polarities with mathematics and proportion. In this way, new dimensions of compositional techniques are aimed to merge the divergent lines between musical space and musical structure, suggesting a unique perspective on Stravinsky's compositional process. Based on the composer's personal accounts and contemporary analyses of Stravinsky's works, my study thus suggests possibilities of conceptualizing music that forms a bond with mathematics and musical structure, embodying a kaleidoscopic impression depicting a "symphony of space."

64 Evangelicals at the Climate Change Crossroads

Steven Perry

Theology | McAnulty College and Graduate School of Liberal Arts

Faculty Advisor: Sebastian Madathummuriyil, Ph.D.

Oral Presenter and Poster

In recent polls on attitudes towards climate change, evangelical Christians are the least likely group to accept both its reality and relevance.¹³⁹ Yet, in 2006, eighty-six evangelical leaders set out to address one of the great moral crises of this generation. The Evangelical Climate Initiative (ECI), a group consisting of various evangelical pastors, scholars, academicians and executives, put forward a

document entitled *Climate Change: An Evangelical Call to Action*.¹⁴⁰ In it was a positive statement—from evangelical Christians—to evangelical Christians— acknowledging the real threat of climate change, while at the same time suggesting positive steps one could take to meet the challenge head on. The ECI’s statement developed in spite of opposition from organizations such as the Cornwall Alliance, a group of evangelical theologians, scientists, economists and other scholars, who deem their fellow evangelicals “climate alarmists.”¹⁴¹ By telling the story of the pioneering efforts of environmentally concerned evangelicals, it will be shown that the hard work of creation care advocates paved the way for a robust statement on climate change to emerge, the *Evangelical Call to Action*. It will also become clear that the opposition against this movement has been driven by a difference in Scriptural interpretation concerning humanity’s role towards creation, one that emphasizes dominion over creation care. In contrast, the ECI statement placed creation care at the forefront of the evangelical consciousness and its impact has been felt in evangelical colleges and universities where students have taken up the cause of combating climate change through establishing various grassroots organizations.

65 An Ethical and Practical Analysis of the Benefits Associated with Compensated Live Organ Donation

Jordan Potter

Center for Healthcare Ethics | McAnulty College and Graduate School of Liberal Arts

Faculty Advisor: Gerard Magill, Ph.D.

Oral Presenter and Poster

In a December 2007 bulletin, the World Health Organization (WHO) reported that 66,000 kidney transplants, 21,000 liver transplants, and 6,000 heart transplants occurred globally in 2005. In the United States less than a decade later, the United Network for Organ Sharing (UNOS), the national transplant organization of the United States, reports that over 123,000 Americans are currently on the United States’ organ transplant waiting list, and over 101,000 of those individuals comprise the kidney waiting list alone. In addition, nearly 16,000 Americans are waiting on a liver transplant, and thousands upon thousands more are waiting for heart, pancreas, lung, and intestine transplants. It is estimated that the organ waiting list is growing by upwards of several thousands of Americans per year.

These statistics highlight the growing crisis that is the global organ shortage. In virtually every nation around the world, the demand for viable organs for transplantation greatly exceeds the available supply. A potential remedy to this issue is to incentivize live organ donation by providing compensation for live organ donation, and in countries such as Iran, the only country in the world to currently have a legal system of compensated live kidney donation, this has been an effective model of organ donation that has ultimately eliminated their kidney waiting list since 1999. In this presentation, I analyze the numerous potential ethical and practical benefits of a national system of compensated organ donation, including but not limited to: erasing national organ waiting lists, providing financial relief to poorer populations, promoting individual autonomy, and reducing the prevalence of organ trafficking and transplant tourism.

66 Simultaneous Inhibition of the PI3K/Akt and MEK5/ERK5 Cascades Reduce Proliferation and Migration in Hormonally Diverse Breast Cancer Cell Lines

Thomas Wright, Christopher Raybuck, Katheryn Wendekier, and Jordan Waddell

Pharmacology | Mylan School of Pharmacy

Faculty Advisor: Jane Cavanaugh, Ph.D.

Oral Presenter and Poster

Aberrations in the Phosphoinositide-3-kinase (PI3K) and Mitogen Activated Protein Kinase (MAPK) pathways have been linked to increased breast cancer proliferation and survival. It has been proposed that these survival pathways are enhanced through compensatory signaling and crosstalk mechanisms. Promising combinations of PI3K and MEK inhibition have been evaluated in phase I clinical trials for various types cancer. However, these clinical trials have had limited efficacy and have yet to encompass the MEK5/ERK5 pathway, a recently discovered MAP kinase, which has been shown to promote cell survival. The goal of our study was to elucidate the role of MEK5/ERK5 in proliferation and migration of hormonally distinct breast cancers. In addition, our study aimed to determine the synergistic effects of dual kinase inhibition. Therefore, to examine proliferation, migration, and crosstalk between these pathways, we treated MDA-MB-231(Triple Negative), MCF-7(ER+), and BT-474(Triple Positive) breast cancer cells with U0126, LY294002, and XMD8-92, known inhibitors of the ERK1/2, PI3K, and ERK5 pathways, respectively. Our results indicate that inhibition of the ERK1/2 pathway led to an increased activation of the PI3K pathway. Interestingly, inhibition of ERK1/2 signaling was not as effective at decreasing breast cancer cell proliferation as inhibition of the PI3K and ERK5 pathways. These data suggest that crosstalk between these kinases occurs, such that inhibition of the ERK1/2 pathways increases PI3K activity. In addition, dual inhibition of PI3K and ERK5 effectively reduced both proliferation and migration in all three cell lines whereas, inhibition of ERK1/2 alone or in combination with PI3K or ERK5 blockade, yielded mixed responses. In conclusion, a combination of PI3K/Akt and MEK5/ERK5 inhibition may prove to be a novel therapeutic approach for treating several types of breast cancer.

67 Exploring the linear water dimer potential curve using quantum monte carlo

Shiv Upadhyay, Jeffry D. Madura, Ph.D.

Chemistry | Bayer School of Natural and Environmental Sciences

Faculty Advisor: Jeffry D. Madura, Ph.D.

Poster

The N-electrons in a system, responsible for the chemical behavior, can be quantified by the Schrödinger equation. This equation for complex systems is mathematically intractable. Widely used approaches to approximate solutions to this equation include post Hartree-Fock (HF) or Density Functional Theory (DFT) methods. However, manipulation of this equation has been shown to resemble a diffusion equation with a sink term; a problem with stochastic solutions. This approach, called Diusion

Quantum Monte Carlo, is favorable as it achieves chemical accuracy with favorable (N^3) scaling of computational resources with system size. Here the linear water dimer is treated at the MP2 and M06-2X levels of theory to provide comparison to quintessential techniques of HF and DFT, respectively, with the modified aug-CC-pvtz with Dirac-Fock AREP pseudopotentials. Ground state energies and geometries are reported.

68 Understanding the thermodynamic stability relationship of ribavirin polymorphs through estimation of transition temperature

Dipy Vasa, Jesse Yu, Peter L.D. Wildfong, Ph.D.

Pharmacy | Mylan School of Pharmacy

Faculty Advisor: Peter L.D. Wildfong, Ph.D.

Oral Presenter

Polymorphism, the ability of a compound to crystallize in two or more solid forms with different conformations of the molecules in the crystal lattice, is frequently encountered in pharmaceutically relevant compounds. The thermodynamic stability relationship between two polymorphs is described as enantiotropism when the transition temperature (T_{tr}) is below the melting temperature (T_m) of either solid forms. Evaluation of T_{tr} is crucial as the order of relative stability between polymorphs reverses above and below this point; or polymorphic interconversion becomes readily accessible. Detailed characterization of the solid forms constitutes an essential part of pharmaceutical research and development. In the present work, Ribavirin ($C_8H_{12}N_4O_5$; anti-viral agent) was crystallized and characterized as two unique polymorphs (R-I and R-II) using X-ray powder diffraction (XRPD) and thermal analysis. R-I (mp 168°C , $\Delta H_f = 175.3 \text{ J/g}$) and R-II (mp 177°C , $\Delta H_f = 165.6 \text{ J/g}$) were determined as enantiotropic systems based on the Heat of fusion rule. Using the melting data and isobaric heat capacities of both the polymorphs, the transition temperature (T_{tr}) was found to be 70.7 . Additionally, a thermodynamic formula using the difference in heat of solution (ΔH_{sol}) between polymorphs and solubility ratio ($SR\text{-I}/SR\text{-II}$) was derived to overcome the limitations associated with the former technique. The transition temperature of ribavirin polymorphs calculated by this formula was in good agreement with the earlier technique, at 69.5°C . The knowledge of this thermodynamic parameter is expected to guide the formulation scientists to adequately modify the heat-laden manufacturing processes of milling, granulation and compaction with a view to alleviate the existing problem of in situ conversion of ribavirin solid forms.

69 A Case Study: Promoting an Equitable Eating-out Food Environment through the Application of a Food Justice Frame

Alexandra Bisesi,

Social and Public Policy | McNulty College and Graduate School of Liberal Arts

Faculty Advisor: Michael Irwin, Ph.D.

Oral Presenter

This case study examines the effectiveness of developing and applying a “food justice frame” as a mobilization tool to promote an equitable Eating-out Food Environment (EOFE) in an urban

neighborhood of Pittsburgh. A mixed-methods approach was taken to gather material and perception data, culminating in a community action meeting to generate interventions. Findings show that a five-dimensional definition of access is appropriate and effective. The dimensions of accessibility and affordability were less important factors of eating-out behavior (EOB) than the other three dimensions. Findings also show that the methods used addressed the concerns of both food access and food sovereignty, which are the primary components of the Food Justice Movement (FJM). Additionally, an effective food justice frame was organically realized through the research process. This frame cradled the community action meeting, equalizing various forms of power, generating acceptable and desirable interventions, and empowering participants to take ownership over their EOFE.

70 Can Socially Responsible Investment Create a Preferential Option for the Poor?

Zachary Dehm

Theology | McNulty College and Graduate School of Liberal Arts

Faculty Advisor: Marie Baird, Ph.D.

Oral Presenter

An important moral question yet to be considered by liberation theologians addresses the advantages and disadvantages of Socially Responsible Investment (SRIs), or the practice of only investing in companies that meet certain ethical criteria. To address this question, I first explore the ongoing debate over whether development theory or dependence theory more accurately reflect how national economies evolve. I argue that SRIs work within a particular brand of capitalism that fosters dependency. Furthermore, I argue that SRIs indicate complacency to the negative aspects of modern capitalism. Here, I touch on the dichotomy between the good intention of SRIs and the tacitly oppressive dynamic inherent to a capitalist system. Second, I consider if the socially responsible investor's actions and experience meet the criteria of that of conversion as outlined by Gustavo Gutierrez. I argue that they do not because they indicate an approval of the oppressive aspect of the capitalist system over a transformation in outlook and approach. Third, I conclude that SRIs constitute a failure to "act" according to the call for a preferential option for the poor. I maintain that there is precedent for liberation theologians to embrace SRIs because of their pragmatic value. However, I argue that because liberation theology calls for conversion and transformation over complacency, SRIs fall short of the call to create a preferential option for the poor.

71 From the Cross to Holy Orders: Chauvet's Symbolic Theology and the Sacramental Implication of Women's Presence on Mt Golgotha in Jn. 19:25-28

Besem Etchi

Theology | McNulty College and Graduate School of Liberal Arts

Faculty Advisor: Marie Baird, Ph.D.

Oral Presenter

Jn. 19:25-28 notes the presence of women at the foot of the cross; actually having ascended Mt Golgotha- the New Sinai! The import of this crucifixion event may resolve the sacramental conundrum of women and Holy Orders. This paper argues that Christ's ritual act of Jn 19:25-28 completes the dispensation for ecclesial identity through the symbolic icon of Mary's female body. First, the paper explores the 'from-word-to-sacrament' journey in Marie-Chauvet's sacramental theology along the revealed pattern: instituted by Jesus Christ for the sake of establishing the Church. Chauvet appropriates Heidegger's critique of metaphysics to posit symbolic exchange as sacrament's core; repudiating scholastic onto-theology in its categories of being, instrument and production. By reading Jn. 19:26-27's double adoption formula "Woman, behold thy son...behold thy mother" via Chauvet's symbolic exchange, I recover a ritual act enacted by Christ. Sebastian Madathummuriyil expands Chauvet's thinking with Marion's apophatic theology and icon-phenomenology to interpret Sacrament as gift. Madathummuriyil employs Karl Rahner's Realsymbol of sacramental symbolic causality, holding scholasticism and phenomenology in relation. By weaving in patristic and contemporary scholarly commentary on Jn 19:25-28, using Madathummuriyil's work, I ascertain the symbolic and iconic efficacy of Mary's female body as Realsymbol in the Johannine event. In addition, the double consent to mutual gift of woman and disciple concludes in Jesus realizing his gift of "power to become children of God" (Jn. 1:12), establishing the Church. This paper concludes by surveying Rom 16, the Vatican's Codex Barberini manuscript, and Mary's priestly activity in John Paul II's Eucharistic theology, for a liturgical history of ecclesial assent to women's apostolic ministry. Recovering Jn. 19:25-28 as an instituted aspect of Holy Orders (Jesus' institution of Mary's spiritual motherhood) mirrors its counterpart, Matrimony, in a twofold call, consent and offering; and culminates a compelling Catholic systematic basis for women in Holy Orders.

72 How Abductive Reasoning Impacts Criminal Investigations

Lyndsie Ferrara, James B. Schreiber, Ph.D. (Co-Advisor)

Center for Healthcare Ethics | McAnulty College and Graduate School of Liberal Arts

Faculty Advisor: Gerard Magill, Ph.D.

Oral Presenter

This research explores the six modes of abduction in relation to reasoning patterns of criminal investigators in an effort to better develop reasoning-in-practice skills for forensic science students. In contrast to deductive and inductive reasoning, abductive reasoning develops potential scenarios and then tests them against the evidence. The six modes of abductive reasoning are based on Charles Peirce's first six classes of signs. The modes are: Hunch, Symptom, Metaphor/Analogy, Clue, Scenario, and Explanation.

Analysis of two exemplar homicide investigation cases are used in this study. The first case examines the murder of Dr. Jeffrey Farkas, a 26 year-old pediatric intern at Children's Hospital in Pittsburgh, who was found brutally murdered in his home. The second is based on historical documentation and is known as the Dutch Case of the Ball Point Pen Murder. In 1991, a woman was found by her son lying dead on the living room floor of her house. Her right eyelid was swollen and slightly wounded. An autopsy revealed a complete ballpoint pen had penetrated her eye causing mortal brain damage.

A comparison of these cases will highlight the importance of abductive reasoning during criminal investigations and ways education can help enhance these skills. In the Dr. Farkas case the criminal investigation team focused on the evidence and began to build that evidence together from hunches, to clues, to analogies, to potential scenarios of who and why. In the ballpoint case, the investigators focused on an explanation, the end stage of abduction, of murder almost instantly. The case then fixated on finding evidence to support the explanation and not the reverse. The investigators appeared to start with induction and deduction rather than abduction. This study demonstrates the reasoning processes that occur in criminal investigations and the importance of using abductive reasoning as a primary investigative tool.

73 “Right to Try” Legislation: A Complicated Ethical Matter

Daniel Hurst

Center for Healthcare Ethics | McAnulty College and Graduate School of Liberal Arts

Faculty Advisor: Henk ten Have, Ph.D.

Oral Presenter

So-called “right to try” laws have witnessed a recent surge in the US. While innovative therapies for a variety of diseases are being developed and approved for market at an increasing rate, the process for getting a new therapy through the clinical trial phase progression, federal approval, and to the marketplace is drawn-out and can take as much as a decade from time of discovery. Due to this lengthy process, there has been a tradition within the area of pharmaceutical development whereby patients with advanced illness, and commonly a terminal prognosis, may be given access to novel but as yet unproven therapies. However, recently, certain advocacy groups have pursued legislative approval for access to such experimental therapies, claiming that patients have a constitutional right to such therapies. Often dubbed either a “right to try” or “compassionate use”, these laws seek expanded access to unapproved drugs, and the system of expanded access has become increasingly controversial. Pharmaceutical developers have no legal or regulatory obligation to deliver access to unapproved therapies on the grounds of compassionate use. Nonetheless, some do, and this process raises a number of ethical challenges to be considered. The chief ethical challenge for expanded access is that patients who have exhausted all standard therapies should have a right to assuage intense suffering and to enhance self-preservation. Yet, at early stages in the development of a therapy, efficacy and safety may be uncertain. The risks of such therapy may outweigh the benefits. In this presentation, concerns surrounding early access to experimental therapies are identified and their potential consequences articulated within a bioethical framework.

74 Embodied Narrative and the Formation of Virtue: Communitarian-Anamnetic Framework in Traditional African Ethic

Clement Kanu

Theology | McAnulty College and Graduate School of Liberal Arts

Faculty Advisor: Marie Baird, Ph.D.

Oral Presenter

Contemporary Africa is not exempt from a global ethical meltdown evidenced in the different forms violence that saturate daily media reports. African examples as found in the South African xenophobia, the Garissa University attack, and the insurgence of Boko Haram in Northern Nigeria stare us at the face not only as instances of human's inhumanity to fellow humans, but also as a demonstration of both a ruptured moral fiber, and a distorted ethical consciousness. Especially unnerving is the contrast between the above image and the "serenity in the pristine African traditional society" structured on a value system that centers on the preservation of life, and emphasizes a shared, reciprocal humanness with a strong sense of community and hospitality. Underscoring the importance of Africa's ancient moral tradition, wisdom, and practice, Martin Prozesky insists that they contain "certain unique qualities that a globalizing world, beset by violence, greed, and environmental damage of a potentially catastrophic kind, badly needs to take on board." Accordingly, the gradual loss of the African traditional ethical system in the contemporary African society is unfortunate. The paper examines the foundations of the African ethical system with focus on the community and its anamnestic thought-structure. It also considers two ways of virtue acquisition and embodiment in the traditional African society (minor genres and initiation). The paper briefly highlights some historical events (slave trade and colonization) that significantly dismantled the African value system and replaced it with a narrative laced with greed, violence, and exploitation. The paper ultimately questions the effectiveness of ecclesial categories in the formation of virtue, and argues for a twofold path to ethical reconstruction in Africa, namely: rejection and adapted revival, insisting that for the reconstruction to see the light of day, the African value system must find its way back into the mainstream of character formation.

75 The Effectiveness of Homework Assignments in Cognitive Behavioral Therapy for Public Speaking Anxiety: A Case Study

Cebraill Karayigit

Counselor Education&Supervision | School of Education

Faculty Advisor: David L. Delmonico, Ph.D.

Oral Presenter

The use of homework assignment in CBT has been considered as an effective intervention in clinical practice (Kazantzis, Deane, Ronan & L'Abate, 2005; Gonzalez, Schmitz & DeLaune, 2006). Many people have considered public speaking as one of the top fears they have in their lives (O'Hair, Stewart & Rubenstein, 2012). College students are not an exception. When working with college students, as counselors, helping to reduce their anxiety can be very important for their journey to reach their goals. Given the success that this researcher has had with anecdotal studies and personal experience as a practicing counselor, this study demonstrates this topic further in support of a case example. This hypothetical case study is offered as an example of how use of some specific homework assignments in cognitive behavior therapy that may be effective among college students, especially with students who have public speaking anxiety. Therefore, this study aims to demonstrate the application of homework assignment in therapy with a student on his public speaking anxiety. Based on previous research and the

case study, the presenter makes specific recommendations on how to overcome the fear of public speaking for the audience.

76 Gender Roles and Miniature Passengers: The Implications of the Victorian Child in Limbo Between the Domestic and Public

Bethany Kaser

English | McAnulty College and Graduate School of Liberal Arts

Faculty Advisor: Anna Gibson, Ph.D.

Oral Presenter

The examination of travel during the Victorian Era is not a new topic—the Victorian Era and the dawn of the steamship made the world more mobile and globalized than ever before. However, examinations of travel in this time period focus almost exclusively on men and occasionally on women. While numerous depictions exist, few actual examinations of the child traveler have been considered. The typical, middle or upper class child is associated most often with the domestic sphere. Illustrations of instances where these children do interact with the public sphere and travel around the globe occur frequently in non-fictional, fictional and archival accounts. This project identifies and analyzes such depictions of the Victorian child.

Many questions could develop from such a study of the child traveler, but one such area worthy of analysis is the gender roles children adopt and are encouraged to adopt when in public. The roles the children fill, both at home and when traveling, are of the utmost importance to understanding the culture at the time since the gender roles enforced in childhood mold what society expected of adults. Exploring what behaviors are expected of children, if they fulfill these roles or if they try to push back against these roles is a useful project for gender, literary and childhood studies. This paper uses accounts of child travelers from archival newspapers, the non-fictional travel writings of Isabella Bird and Frances Trollope and J.M. Barrie's Peter and Wendy to establish a collection of child traveler illustrations for the examination of gender role expectations and enactments in traveling children.

77 Temporally Pricing low or Spotighting Your App? : An empirical study on Amazon Free App of the Day

Kevin Lachaud, Wenqi Zhou

ISM | A.J. Palumbo School of Business Administration

Faculty Advisor: Wenqi Zhou, Ph.D.

Oral Presenter

This research examines the effect of visibility and pricing, and their interaction effect, on apps' market performance. In particular, we empirically study Amazon's Free App of the Day, which puts a single app daily in the spotlight at a zero price. Using data from Amazon, we differentiate between high visibility and temporally free pricing resulted from this promotion strategy. We test how they affect product popularity on Amazon, i.e. volume of online user-generated conversations and sales rank, which in turn affects apps' sales and revenues on the Android app market.

78 Moving beyond the boat: Using young adult literature to scaffold teacher candidates' understanding of the immigration experience

Ben Mast

Department of Counseling, Psychology, and Special Education | School of Education

Faculty Advisor: Carla Meyer, Ph.D.

Oral Presenter

With the convergence of the changing demographics in schools and the prevailing anti-immigration sentiment in the United States, teachers must play an integral role as change agents and advocates for students of immigrant families. As part of the Spiritan mission of awareness of global concerns, proper service to this population is essential in providing educational justice. This study gathered student archival data to examine how the use of adolescent literature might be used to educate preservice teachers on the immigration experience. As part of an adolescent literature course, an immigration unit asked students to read a piece of adolescent literature that told an immigration story, participate in an online book club to discuss the story, and write an immigration story of their own. Student feedback and impressions were recorded via an online survey and a small focus group. The researchers also used a qualitative, deductive coding system to label demonstrations of empathy, advocacy, cultural awareness, and assessment of course throughout course artifacts. Preliminary analysis of the data indicates that while students were initially resistant to identifying themselves as change agents and advocates, analysis of the final project and reflection indicates that the methods utilized in the course acted as avenues by which students were able to build an empathic understanding of the challenges faced by immigrant populations. Students reported via the survey that the immigration unit had a strong effect on their understanding of and ability to empathize with immigrant populations. Limitations of the current study and suggestions for further research are discussed.

79 Evaluation of Liposomal Bupivacaine in Total Knee Arthroplasty

Lois Schertz, Lawrence, B. & Levison, T.

School of Nursing Graduate Programs | School of Nursing

Faculty Advisor: Mary Loughron, Ph.D.

Oral Presenter

Pain is an anticipated consequence of total knee arthroplasty and total hip arthroplasty. Patient satisfaction and outcomes after total joint arthroplasty may be directly affected by postoperative pain management. In order to improve these outcomes numerous techniques are used to gain effective pain control. In order to control postoperative joint replacement pain, periarticular injections are often used as one aspect of a multimodal pain control technique. A long acting bupivacaine, a type of periarticular injection, has been introduced and reported to be more effective than prior methods (Lambrechts, M. et al., 2013). The purpose of this study was to compare the use of periarticular injections using a liposomal bupivacaine as compared to plain bupivacaine in patients undergoing total joint replacement. To be included in the study, the patients had to participate in our standard multimodal pain control pathway which included: spinal anesthetic with intrathecal morphine, oral acetaminophen, cox-2 inhibitor, pregabalin and oral narcotics. Outcome measures included pain scores, physical therapy parameters,

antiemetic use, elapsed time to first narcotic use, as well as total narcotic consumption measured by the daily morphine equivalent dose. Our study found that periarticular injections, whether liposomal or plain bupivacaine, resulted in decreased pain, less narcotic consumption, and earlier tolerance of physical therapy when compared to historical controls. The liposomal bupivacaine group experienced the least pain at time of physical therapy while the plain bupivacaine group consumed the least amount of narcotics. Multimodal pain management that includes periarticular injections result in improved pain control but the benefit of a long acting liposomal bupivacaine still needs to be researched more. Consequently, this study showed the cost of the long acting liposomal bupivacaine outweighed the benefits resulting in its lack of use.

Reference:

Lambrechts, M., O'Brien, M., Savoie, F., and Zongbing, Y. (2013). Liposomal extended release bupivacaine for postsurgical analgesia. *Patient Prefer Adherence*, 6(7), 885-890.

INDEX BY SCHOOL**Last, First – Abstract Number****A.J. PALUMBO SCHOOL OF
BUSINESS ADMINISTRATION**

Lachaud, Kevin - 77

**BAYER SCHOOL OF NATURAL &
ENVIRONMENTAL SCIENCES**

Anaokar, Sanket - 2
Broderick, Jennifer - 7
Castellano, Holly - 9
Colvin, Amanda - 12
Herneisey, Michele - 25
Howell, Laura - 18
Jevit, Matthew - 20
Keeney, Jacob - 59
Kondratyuk, Tetiana-38
Lax, Neil - 23
Liu, Simai - 25
Mashuda, Emily - 30
Mcaninch, Damian - 32
Mcquaid, Neal - 36
Nolan, Colleen - 38
Polaski, Anna - 43
Sadler, Katelyn - 44
Sciences, Joseph Sallmen - 46
Seitz, Ashley - 57
Sethi, Sumedha - 56
Shane, Jackie - 55
Thomas, Jessica - 53
Umstead, Tyler - 49
Upadhyay, Shiv - 67
Veeramachaneni, Rathna - 52

**MARY PAPPERT SCHOOL OF
MUSIC**

Carraher, Thomas – 58
Goodwin, Maura – 15
Hoffmann, Jason – 61
Lapisardi, Emily – 22
Lobe, Matthew – 27
Lowery, Brenden – 29
Meyer, Benjamin – 63

**MCANULTY COLLEGE AND
GRADUATE SCHOOL OF LIBERAL
ARTS**

Afolabi, Michael - 34
Berndt, Adrienne - 4

Brown, Elizabeth - 8
Bisesi, Alexandra - 69
Cook, Ashley-17
DelGreco, Gina - 14
Dehm, Zachary - 70
Etchi, Besem - 71, 12
Fanzo, Justin – 17
Ferrara, Lyndsie - 72
Gu, Li
Hurst, Daniel - 73, 31
Hoffmann, Theresa - 17
Kanu, Clement - 74, 40
Kaser, Bethany - 76
Mattone, Amanda - 62
Perry, Steven - 64
Potter, Jordan - 65
Reznik, Alexandra - 35
Sullivan, Theresa - 26
Patterson, Megan - 41
Vicarel, Megan - 51
Weaver, Sarah - 47
Xu, Ke - 50

MYLAN SCHOOL OF PHARMACY

Ahmed, Kh Tanvir – 1
Bondi, Corry – 6
Dashputre, Ankur – 11
Kallenbach, Maeve – 21
Maria, Sifat – 28
Mason, Daniel -31
Staub, Corinne -37
Pellegrene, Kendy – 42
Wasko, Michael – 48
Liu, Lu – 60
Osagiede, Nosarieme – 21
Raybuck, Christopher - 66
Shupe, Jessica – 21
Wendekier, Katheryn - 66
Wright, Thomas – 66
Vasa, Dipy – 68

Yu, Jesse - 68

**RANGOS SCHOOL OF HEALTH
SCIENCES**

Hannah, Daniel – 16
Hill, Nicole – 19
Romanyshyn, Katherine – 19
Sommer, Carly - 19

SCHOOL OF EDUCATION

Aston, Candice – 3
Berbary, Cassandra – 5
Chatlos, Suzannah-10
Chen, Xiaohan – 13
Fritsch, Rebecca- 5
Lattanzio, Latitia - 10
Tamayo, Sareska – 45
Shelpman, Stephanie – 54
Karayigit, Cebrail – 75
Mast, Ben – 78

SCHOOL OF NURSING

Lengetti, Evelyn – 24
Proie, Courtney -33
Vitko, Heather – 39
Wallace, Katheleen – 40
Schertz, Lois - 79