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The AUC Undergraduate Journal of Liberal Arts and Sciences is a biannual, interdisciplinary publication showcasing outstanding undergraduate academic papers. The Journal aims to demonstrate the strength of undergraduate scholarship at AUC, to reflect the intellectual diversity of its academic programme, to encourage best research and writing practices, to facilitate collaboration between students and faculty across the curriculum, and to provide students with opportunities to gain experience in academic reviewing, editing and publishing.

## FOREWORD

Interdisciplinary – few words so accurately describe the contents and ideals, as well as the struggles, of the AUC Undergraduate Journal of Liberal Arts and Sciences. Each discipline has independent functions, problems, and ideas; yet academic discourse on those ideas and problems is shared between disciplines through the written word.

Now in its third year and sixth volume, the journal's open issue continues to celebrate the interdisciplinary nature of AUC students' education, interests, and work. InPrint itself is a team of student editors from all academic disciplines and nationalities, and this volume of student work is the result of further collaboration with AUC faculty and the AUC student association.

Although the year has not been without its challenges for InPrint, we have united behind the shared ideal of a published platform for student writing that explores new and old concepts with an open and analytical

perspective, in the spirit of the liberal arts and sciences. This was not our ideal alone, and we are continuously grateful for the support received from all sides of the AUC community; the dedicated efforts of our peer reviewers, faculty advisors, editors, and authors.

This year's authors have covered topics ranging from naked mole rats, to music psychology, to the theatrum mundi metaphor. Their papers explore old and new concepts, hoping to stimulate further analysis and inspire new thinking. Selected by the InPrint editorial board and its faculty advisors, they were chosen for the quality of their ideas, argumentation, and writing. These papers represent some of the subjects that engage AUC students' minds, and in publishing their work this journal hopes to be a platform for both expanding knowledge, and opening up discourse.

*Sanna McGregor, on behalf of InPrint*





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**CALL FOR PROPOSALS:**

# Liberal Arts and Sciences Education and Core Texts in the European Context Conference

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Friday 11 September – Saturday 12 September 2015

Amsterdam University College,

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## STUDENT PARTICIPATION

The conference has several panels reserved for student participation. A student panel will be chaired by a faculty member and will include up to four student presentations. The organizing committee welcomes paper proposals that connect to the conference theme. In particular, the conference invites students to reflect on the meaning of a well-rounded liberal education and the role and meaning of core texts in one's curriculum. How has a core text changed your mind on something, provided you with a broader perspective or taught you something about yourself? The conference defines core texts in an inclusive way as any classic text that provides for a shared discourse, whether from the Western or non-Western tradition, from ancient to postmodern time periods, and embedded in the humanities – philosophy, literature, history, and the arts – the social sciences – politics, anthropology, sociology, economics, and law – or the natural sciences – biology, physics, mathematics, and so forth. Please send an email to [libartsconf@gmail.com](mailto:libartsconf@gmail.com) for a full conference description.

The application procedure is as follows:

- The student develops a one-page, double-spaced proposal.
- The proposal should state the tentative paper title and identify the core work and any other works to be discussed.

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# The Portrayal of Revenge in Japanese Cinema

Sarah Rome





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## ABSTRACT

An analysis of the cinematic portrayal of revenge, a deep-rooted concept in Japanese culture, illustrates the central role it plays in Japanese society. A historical approach will be most useful in drawing conclusions on how Japanese perceptions of revenge have changed since the Tokugawa period (1603-1867). This paper relates old and new scholarly articles, most importantly those of Lafcadio Hearn, Marilyn Ivy, and Lisa Narroway, to two renowned Japanese films, Kenji Mizoguchi's *The 47 Ronin* (1941) and Tetsuya Nakashima's *Confessions* (2010). By exploring the meanings, history, and social context of *fukushuu* (revenge), this essay concludes that the modern Japanese perception of revenge is less positive, or heroic, than that of the feudal Japanese. This is partly due to the decline in glorified samurai ideals of honour and self-sacrifice after Japan's surrender in World War II. Nonetheless, despite the change in perception, *fukushuu* remains a deeply ingrained motif in Japanese culture, particularly due to its positive relationship with justice, loyalty, and responsibility.

## INTRODUCTION

*Fukushuu*, the Japanese word for "revenge", translates to "the repetition of hate". It often relates to themes in literary and visual culture like responsibility, remorse, pride, and honour. Although the notion of revenge is almost universal across cultures, even more so in historical times, it remains an especially deep-rooted concept in Japan. An analysis of the cinematic portrayal of this motif illustrates the role it plays in historical Japanese society by demonstrating the overall positive depiction of *fukushuu*, and why the concept remains important today. For the purposes of this paper, a positive depiction refers to the depiction of a heroic deed that is well respected or admired. The analysis includes both formal elements, including *mise-en-scène* and editing techniques, and narrative elements, including plot and characterisation. Beginning with a discussion on the meaning of revenge and its historical context, this paper subsequently examines and compares two films: Kenji Mizoguchi's *The 47 Ronin* (1941) and Tetsuya Nakashima's *Confessions* (2010). While the former is the cinematic adaptation of a three-century-

old samurai legend, the latter case study depicts revenge today. The use of both historical and recent scholarly articles helps correlate *fukushuu* depicted in film with *fukushuu* as it is conceived in society. Some scholars, especially Lafcadio Hearn, a late-19th century connoisseur of Japanese legends, discuss the social attitudes towards vengeance in Japan's feudal era, which support the analysis of *The 47 Ronin*. Other more recent scholars, primarily Marilyn Ivy and Lisa Narroway, enhance the analysis of *Confessions* by providing insight into why revenge continues to be significant in post-World War II Japan. With a limit of two case studies, this paper does not draw conclusions relevant to all of the various portrayals of revenge in Japanese cinema. Rather, it suggests that revenge is important in Japanese culture mainly because of its relationship with moral values like responsibility, justice, and loyalty.

## WHAT IS REVENGE?

Revenge commonly refers to an act of injuring an individual or a group in response to another harmful deed. It almost always involves more than





one victim of a crime that is to be avenged, which is any person who is psychologically or physically harmed by another. Revenge more specifically refers to a personal sense of justice, meaning that the people who sympathise with one of the victims often enact revenge in opposition to their country's laws because they do not believe that those laws allow for satisfactory justice. The concept of revenge in Japan, which this paper refers to as *fukushuu*, has rather unique characteristics, such as the remarkably strong sense of moral duty, loyalty, and self-sacrifice. As Hearn remarks, whereas in many societies' history revenge often ascribes to religion, in Japan revenge becomes "a religion of self-sacrifice" through a duty of allegiance to a master that is religious in essence, and this religious characteristic has persisted up to the modern day (196). However, what is most exceptional about *fukushuu* is that it has persisted as a deeply ingrained cultural concept for centuries.

### REVENGE IN FEUDAL JAPAN

The concept of *fukushuu* derives from a mixture of Confucianism and Buddhism, which have had a significant influence over the historical development of Japanese ideologies. While the former emphasises communal and social relationships, Buddhism maintains that suffering is part of the human condition (Thornton 23). Documentary records of vengeful acts suggest that revenge became more prominent during the Tokugawa feudal era (1603-1867). The samurai, who served as military nobles for the *daimyo* (feudal lords), are particularly notorious for their legendary acts of revenge, often for the benefit of their lord. It is here that Japanese Confucian ideas about revenge differ from those in China: While China emphasised family loyalty, encouraging revenge only for the benefit of one's blood-relations, Japan emphasised feudal loyalty, promoting vengeful acts in the interests of one's lord or master. Broadly speaking, feudal Japan considered revenge part of a moral and civilised code, a deed performed in favour of someone else, rather than for personal grievances. During the Meiji period (1868-1912) that followed the Tokugawa era, the Japanese government adapted this altruistic revenge code to suit the promotion of nationalism. This became significant when Japan gravitated toward a more Western model of civilisation (Mills 529). New Japanese leaders soon denounced *katakiuchi*, or

"revenge killings", that were performed as "an act of filial piety or fraternal duty", rather than as a duty towards one's nation (Mills 532). However, although the samurai ideal of vengeance slowly faded out of practice, Hearn remarks, "the religion of loyalty, evolved by a thousand years of war, could not be cast away"; rather, it became something like the "modern sense of patriotism" (203). In popular culture, Mills points out, "vengeance as a subject of drama remains just as popular today as it was in the Tokugawa period" (542). Hearn adds that part of the persistent appeal of such drama is due to "the duty of sacrifice and courage, the religion of loyalty" (199).

*The 47 Ronin*, which concerns samurai who have lost their lord and consequently become *ronin*, or "wandering samurai", is one of the most famous cultural depictions of a heroic act of *fukushuu*. The legend begins in 1701, when the feudal lords Asano Naganori and Kira Yoshinaka are in charge of organising a reception for the Emperor's envoys. Due to the open contempt with which Kira treats Asano, Asano impulsively attacks Kira and is immediately sentenced to commit *seppuku* (ritual suicide) by the authorities. Out of grief and feelings of injustice, the *ronin*, who once served under Asano's lordship, plan and wait for two years in order to avenge their master's death. They wait patiently because if the public regard their actions as rash, then their revenge would lose legitimacy and meaning. Finally, on 30 January 1703, they succeeded in killing Kira. The heroism of the forty-seven *ronin* "was a stimulant to all areas of this discourse on the way of the samurai, including of course the popular arts" (Gerstle 309). Despite their act of vengeance being improper according to the principles of the Testament of Ieyasu, the authorities regarded the act as justified and therefore allowed the *ronin* to die honourably via ritual disembowelment (Mills 537). During this period in particular, the Japanese regarded honour as a fundamental duty to protect the respectability of one's family or household. This helps explain the motivation behind *fukushuu* as well as the significance of the right to ritual disembowelment.

The formal elements of *The 47 Ronin* best demonstrate cinema's portrayal of *fukushuu*, especially in the scene in which the *ronin* bring Kira's decapitated head to Asano's tomb and dutifully report to their master's spirit about their successful revenge. The







scene, lasting a total of six minutes and twenty seconds, consists of only three shots. The long takes add to the dramatic effect and solemn attitude of the film. Moreover, the film scarcely shows any violent scenes and instead focuses on the characters' emotional suffering. Indeed, the audience never sees the actual act of revenge around which the story pivots, but jumps straight to the scene at the tomb, in which the *ronin* express their mixed feelings of joy, pride, and remorse. The lack of explicit violence supports the idea that *fukushuu*, at least in feudal Japan, was a familiar and civil act. Regardless of any sorrowful feelings, the cinematic portrayal of *fukushuu* is rather positive because it depicts it as an act of heroism and honour.

### REVENGE IN POST-WAR JAPAN

Today, Japanese people do not typically exhibit the same patterns of devotion and loyalty as they did in the feudal era. So it is curious what new motivations there may now be behind the act of *fukushuu*. Ivy argues that since its defeat in World War II, Japan has been experiencing chaos that is masked by peace, a peace that has been "pushed to its limits" (831). She argues that pessimistic post-war emotions tend to manifest themselves in modern culture, such as through the breakup of the family. Lisa Narroway also attributes some of the most profound changes in attitude to loyalty and self-sacrifice to the disillusionment of heroism during World War II. For war propaganda, the Japanese state elite heroized the samurai ideals of loyalty, obedience, and self-sacrifice. *The 47 Ronin*, released during the middle of the Second World War, is a perfect example of this form of propaganda due to its heroic portrayal of the *ronin's fukushuu*. However, despite this attempt to increase patriotism among soldiers, "people prioritised their family and friends over the Emperor" (Narroway 71). People were often more concerned with personal and immediate issues such as lack of food and other basic needs. After Japan's surrender, there was an "almost immediate erasure of the image of the nationalistic samurai" (Narroway 76). However, although the sense of self-sacrifice for the nation declined after World War II, values such as loyalty to one's loved ones remained strong.

Nakashima's *Confessions*, set in the 21st century, exemplifies how Japan continues to emphasise loyalty and justice, despite the post-war disillusionment of

the "heroic samurai". It does this through an explicitly violent and chaotic, rather than heroic, depiction of *fukushuu*. Based on a 2008 novel by Minato Kanae, the story revolves around the vengeance of a junior high school teacher, Yuko Moriguchi, whose four-year-old daughter was murdered by two of her students. Since the guilty students, Shuya Watanabe and Naoki Shimamura, are protected from arrest under the Juvenile Law of 1947, Moriguchi decides to take revenge in her own way. She tells her class that she put her ex-husband's HIV-contaminated blood into the two students' milk cartons in order to publicly shame them. The story gradually reveals two other characters' desire for vengeance: that of Shuya Watanabe, who helps murder Moriguchi's daughter to seek the attention that he lacks from his own mother; and that of Naoki Shimamura's mother, who blames Moriguchi for her son's declining mental health. Notably, all three cases of *fukushuu*, including that of Moriguchi, are manifested through broken mother-child relationships. The absent fathers are a further indicator of a lack of family stability. The dark and chaotic portrayal of these broken families demonstrates Ivy's point that contemporary literary and visual culture commonly express negative post-war emotions. However, in each broken relationship there is a wish for revenge to restore whatever is missing in the family, thereby demonstrating a strong sense of loyalty for personal affairs. Furthermore, it is difficult to pinpoint a heroic figure in the film, if there is one at all. Instead, all the characters act as both victims and culprits, and have few identifiable heroic traits. The lack of detectable heroism likely indicates a change in Japanese attitude towards *fukushuu* when compared to *The 47 Ronin*, which strongly emphasises the heroism of the *ronin*. Therefore, *Confessions* demonstrates a changing cinematic portrayal of *fukushuu*, depicting it as a pessimistic and non-heroic act. However, it still affirms the importance of loyalty and justice, even if only for personal reasons.

Formal elements in the final scene of *Confessions* further demonstrate a modern cinematic portrayal of *fukushuu* through the themes of chaos and antagonism. The scene focuses on the teacher's revenge against Shuya Watanabe. Moriguchi communicates with Watanabe over the phone during a school assembly. In contrast to the intensity of their conversation, the other students in the assembly





stand to sing a hymn. The contrast between the disturbing and tranquil atmospheres supports Ivy's point that underneath a seemingly peaceful environment lies chaos. The entire scene is dark, grey, and contains blood, screaming, and an explosion that kills Watanabe's mother, thereby emphasising the chaos and antagonism. It is worth noting that the scene is set in a school, in which Moriguchi's aim is not only to get revenge, but also to teach her pupils about the importance of life. This is significant because it suggests a fresh aspect of *fukushuu*: revenge as a learning opportunity. Although many Japanese people became disillusioned about heroic self-sacrifices after the Second World War, *fukushuu* may still be ideal in the sense that it provides an opportunity to learn from one's mistakes.

#### REVENGE: A CINEMATIC COMPARISON

In comparing the two films, one can begin to draw conclusions about how cultural perceptions of *fukushuu* have changed in Japanese history. Both films deal with motifs like justice, punishment, grief, and responsibility. They both relate to pride and honour, although *The 47 Ronin* more precisely contextualises these ideals within the samurai code. The films portray *fukushuu* as a necessary act, regardless of the law and any feelings of remorse. These related themes help characterise the notion of *fukushuu*. It is interesting to note that vengeance in both films requires public attention and approval in order to gain a sense of justification. In *The 47 Ronin*, the *ronin* wait two years for their revenge in order to avoid jeopardising public approval. In *Confessions*, Moriguchi makes sure that she brings extreme shame to the two students in front of the entire school. Furthermore, it is worth noting that while *The 47 Ronin* emphasises a group cause, *Confessions* deals with individual grievances and family bonds. This supports Narroway's discussion of the disillusionment of samurai ideals in post-World War II Japan. One of the most important differences is that in feudal Japan, there was a much higher sense of morality and civility regarding revenge than there is today. However, a strong sense of justice remains in both eras, with justice meaning that a satisfactory level of punishment has been given, either by the law or by the individuals involved, to those guilty of an immoral deed.

*Fukushuu* remains deeply ingrained in Japanese culture because of the continued emphasis on justice

and loyalty. Part of its significance is further due to the promotion of cultural values: in the *The 47 Ronin*'s historical portrayal, *fukushuu* functions as propaganda to promote the heroic ideals of obedience and self-sacrifice for one's superior; in *Confessions*' post-war portrayal, the moral of the story is to remember the importance of life. The crucial difference between the two films, however, is that the modern depiction of *fukushuu* is violent and antagonistic; it is no longer part of a high sense of morality and code of honour. Through this realisation one may wonder about the future of *fukushuu* as a cultural concept. Without the same sense of civility that was present in feudal Japan, is it possible to take revenge without associating it with violence? If one defines violence as a lack of civility, then it appears that an immoral, yet peaceful, notion of revenge would be impossible. Perhaps it is also the case that many people, and not just the Japanese, have yet to be disillusioned with the amount of justice that revenge actually serves. However, if this occurs, it will likely be because the meaning of justice will change. Thus, the future conception of *fukushuu* depends largely on other related definitions that depend on the circumstances of the time, just as the Japanese concept of self-sacrifice changed during and after the Second World War.





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# *Theatrum Mundi* Metaphor in Western Literature throughout Shifting Historical Contexts

Isa Altink



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## ABSTRACT

Through secularisation and Enlightenment a religious framework with a philosophy of life that includes a determinant God has been replaced by a more individualistic, and existential philosophy, which centres on personal responsibility instead of divine determination. These philosophies can be recognized by analysing the *theatrum mundi* metaphor of 'the world as a stage', which has been used in Western literature, poetry, and drama since the 16th century. Upon close examination, one can see that these various occurrences all entail different interpretations of the same metaphor. This paper examines a number of case studies, ranging from Desiderius Erasmus to Samuel Beckett, in chronological order. By taking the *theatrum mundi* metaphor as a focal point of analysis, while comparing these different works of literature and moving from a medieval religious text to an existential play, the impact of Enlightenment and secularisation on society and culture becomes evident. This comparison places the way we think about life in contemporary Western society in a broadly historical and literary context.

In his poem 'O Me! O Life!' (1892), Walt Whitman answered his question about what good there is in the useless struggles of life, by saying: "That you are here – that life exists and identity, that the powerful play goes on, and you may contribute a verse". In saying this he made use of a metaphor called *theatrum mundi*. This term, which originates in the Baroque period that started in the 17th century, expresses the idea of 'the world as a stage' or 'life as a play', and is phrased most succinctly in Shakespeare's play *As You Like It* (1600): "All the world's a stage and all the men and women merely players..." (II.vii lines 138-139). Since then, but also before the term was coined, this metaphor has occurred often in Western literature, several of which will be addressed in this paper: Desiderius Erasmus' *Praise of Folly* (1511), the poem "What is Our Life" (around 1600) by Sir Walter Raleigh, William Shakespeare's *Hamlet* (1603), and Samuel Beckett's *Endgame* (1957). These works of literature by English, Irish, and Dutch authors stem from the 16th to 20th century, a period in which Enlightenment and secularization radically changed Western European

societies. The aim of this essay is to compare the various interpretations of *theatrum mundi* in these works, and to examine how they portray views on what constitutes human life, while shifting from a religious to an existential framework according to their historical contexts.

The earliest work this essay takes into account is *Praise of Folly* (1511), a satirical work written by Christian humanist Desiderius Erasmus in the beginning of the 16th century. In this text, which is seen as a significant contribution to the Renaissance and Protestant revolution, the metaphor of life as a play is explicitly used by the narrator, Folly:

*Now the whole life of mortal men, what is it but a sort of play, in which various persons make their entrances in various costumes, and each one plays his own part until the director gives him his cue to leave the stage? Often he also orders one and the same actor to come on in different costumes, so that the actor who just now played the king in royal scarlet now comes on in rags to*





*play a miserable servant. True, all these images are unreal, but this play cannot be performed in any other way. [Erasmus, Praise of Folly, 1925]*

His notion of the 'director' is an interesting historical cue, seeing as Erasmus was a humanist who supported the revision of the ecclesiastical policy, yet remained loyal to the Catholic Church throughout his life. The presence of the director seems to refer to a directing God, who determines the life and fate of the actors, human beings, for he determines which role they are to play. Thus, this expresses a conception of human life on earth as a play in a theater; it is rather arbitrary, because each person may be summoned to play either this role or that role, wear now this, then that costume, with nothing intrinsic to them determining which role or costume is best suited. Despite this arbitrariness, the individual actor has limited freedom, since there is an external director, who determines the human fate and thus the "play cannot be performed in any other way".

Roughly a century later, in the period of the English Renaissance around which time the term *theatrum mundi* originated, Sir Walter Raleigh composed the poem "What is Our Life" in which he addresses the same notion of the world as a stage.

*What is our life? A play of passion,  
Our mirth the music of division,  
Our mother's wombs the tiring-houses be,  
Where we are dressed for this short comedy.  
Heaven the judicious sharp spectator is,  
That sits and marks still who doth act amiss.  
Our graves that hide us from the setting sun  
Are like drawn curtains when the play is done.  
Thus march we, playing, to our latest rest,  
Only we die in earnest, that's no jest.  
(Raleigh, *What is Our Life*, n.d.)*

Like in *Praise of Folly*, there is a religious aspect to the metaphor of life as a play. The "play of passion" (Raleigh) for example, could be interpreted as a reference to the life of Christ. However, there is also a notable difference. The line "heaven the judicious sharp spectator that sits and marks still who doth act amiss" offers an image of a God who, unlike Erasmus' director, does not interfere with the performance of the actors, but functions merely as spectator and

makes records of their good and bad deeds. This difference designates a shift in conceptions of religion, which now seem to attribute less determinant power to divinity. Although the poem reflects on the brevity and arbitrariness of life, it has a similar light-hearted tone as Erasmus' *Praise of Folly*.

Continuing in the literary tradition of the English Renaissance, one is inevitably led to the works of William Shakespeare. Besides the explicit phrasing of the *theatrum mundi* in *As You Like It*, the metaphor appears in many of his other works as well. The character Hamlet for example, struggles with an inner conflict throughout Shakespeare's eponymous play from around 1600. He finds himself in a complicated situation, in which he intends to avenge his father's murder, committed by his uncle who now reigns over Denmark and has an affair with Hamlet's mother. Hamlet seems to be stuck between a role that is divinely assigned to him on the one hand, and the possibility of self-determination through taking on another role on the other hand:

*This is most brave,  
That I, the son of a dear father murdered,  
Prompted to my revenge by heaven and hell,  
Must, like a whore, unpack my heart with words,  
And fall a-cursing, like a very drab,  
A scullion!  
(Shakespeare, *II.ii* 537-542)*

This designates a similar role ascribed to divine power: present, yet not determinant.

The theme of which role to play is important throughout the entire play. Hamlet, for example, tells Ophelia, who is also generally confused about her identity: "God hath given you one face, and you make yourselves another" (Shakespeare, *III.i* lines 137-138). This addresses Hamlet's own main struggle as well: he is well aware of the 'world as a stage', but is too caught up in contemplating the possible roles he may take on to actually perform any of them. He states:

*Thus conscience does make cowards of us all,  
And thus the native hue of resolution  
Is sicklied o'er with the pale cast of thought,  
And enterprises of great pitch and moment  
With this regard their currents turn awry  
(Shakespeare, *III.i* lines 83-87).*





Along the lines of the performance metaphor, 'to act' can here be defined in two ways: to undertake action and to play a role, which in the case of Hamlet coincide. Not only is he unable to take action, but because he seems to have fallen out of any role, he even contemplates death: "to be, or not to be" (Shakespeare, III.i lines 57).

*Hamlet* thus in fact addresses issues of existential anguish and freedom, or the explicit question why we would not kill ourselves if life is meaningless. These kinds of issues are also addressed by Albert Camus in his work *The Myth of Sisyphus* (1942), for example. The link from *theatrum mundi* to existential philosophy is thus easily made, for the image of life as a play purports the indeterminate character of life, the lack of essential meaning that corresponds to Sartre's existential conviction that "existence precedes essence" (Sartre, 1946). The existential realization of the world and one's part in it, and thus the consciousness of the meaninglessness of life can, in light of the metaphor, be seen as 'seeing the back of the stage': the 'metatheatrical' realization that all human beings are merely acting out roles in a play that does not lead to any higher goal or conclusion. It is no surprise that after two world wars the faith in an omnipotent and infinitely good God decreases and a new idea gains popularity: that "man is condemned to be free: condemned, because he did not create himself, yet nonetheless free, because once cast into the world, he is responsible for everything he does" (Sartre, 1946, 29).

This idea is on the one hand depressing (or as Sartre would say: nauseating) and could lead to the inability to act, to play one's role in life. Because of this, it might even lead to contemplating suicide, as has happened to Shakespeare's Hamlet. However, it also contains a certain freedom. Because if the world is a stage and the people only players, and there is no longer a director in the sense of a determining God, then one might as well determine one's own role and direct one's own play. As such, the existential philosopher Heidegger reasoned that through the existential realization that life is a play "the dreamer [actor] himself becomes open to possibility, and he gains mobility. He can become a more versatile interpreter of himself and his world, capable of multiplicity of interpretation" (Pearce, 1980). The *theatrum mundi* metaphor, including the freedom to choose one's own role, can thus be seen as a human

response to the feeling of meaninglessness that may emerge from the loss of a higher goal or meaning and the outlook towards life related to or prescribed by a religion.

In what might be considered the artistic realization of Camus' existential philosophy (1942), the 'Theatre of the Absurd', Samuel Beckett's *Endgame* provides another, rather gloomy, image of life as a play. The main concerns of this text, which is of a clearly existential nature, are the four characters, set in an absurd environment, and their relation to each other and to the world. The characters seem to be aware of their lives as mere performances devoid of meaning. Nell, for example, asks herself: "Why this farce, day after day?" (Beckett, 2221), and Clov later suggests: "Let's stop playing!" (ibid, 2235). Regarding *Endgame* as the artistic embodiment of the existential philosophy of the Absurd, it is self-evident that there is no determinant divine force present in the performance. After suggesting praying to God, Hamm shouts: "The bastard! He doesn't exist!" (ibid, 2228). Thus, the human beings in the play bear full responsibility for their own lives, and the roles they decide to play in them. However, it seems that it is really Hamm who is directing the play and their actions. Throughout the play, Clov is always commanded by him: "Do this, do that, and I do it. I never refuse. Why?" (ibid, 2224). Hamm responds to this: "You're not able to" (ibid). Hamm also seems to know when it is time for what, as for example when he tells Clov that he is "warming up for [his] last soliloquy" (ibid, 2235).

However, from the gloomy atmosphere of the whole play, and the repetitive behavior of each character, seemingly stuck in their role, it appears that they do not know how to deal with their existential freedom without divine guidance. They also never seem to be able to grasp what exactly is going on, which is apparent from Hamm and Clov's repeated question and answer: "What's happening?", "Something is taking its course" (ibid, 2221). They are thus constantly trying to discover a meaning to life, whereas at the same time they seem to be aware that there is none to be found. The end of the play, according to the *theatrum mundi* metaphor and perhaps also to the play's title, implies the characters' death. In the final sequence of the play, Hamm says: "Since that's the way we're playing it... let's play it that



way... and speak no more about it... speak no more" (ibid., 2238). He seems to be aware of the arbitrariness of the performance of their lives, and their inevitable death as the play ends. One could, however, also imagine that the same play will be executed again the next day, with the same request for meaning to the world, and the same lack of answer from the world. This ongoing search for meaning in life, which Christianity could prescribe to people in a narrative of divine power in the 16th and 17th century, illustrates that within an existential framework people are freer because they can determine their own role, yet they may also be paralyzed in the vacuum in which they need to create meaning for themselves.

To conclude, examining the *theatrum mundi* metaphor in various Western literary works throughout shifting historical contexts reveals how the conception of, and attitude towards, human life has changed over time, according to social developments such as Enlightenment and secularization. Starting from the 16th century, the role of God as a determining power in human existence has slowly but surely decreased. Concluding with *Endgame's* fully existential expression of life as a play, and the human being as the director of his own existence, it seems that throughout history, with the loss of a religious framework and the increasing conviction of an existential philosophy, human beings have lost certain guidance in their life which provided them with purpose. The "multiplicity of interpretation" (Pearce, 1980, 47) which Heidegger argues becomes possible with an existential outlook on the world stage, and the multitude of roles there are to play, appears to be capable of having a paralyzing effect on the actors. Such is the experience of Hamlet, as the creation of an author who was apparently ahead of his time: stuck between a period of with Catholic framework woven into everyday life and a period lacking any guiding framework, and thus unable to act.







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# Through the Boom and on to Chatham

The Dutch Raid on the River Medway and the  
Naval Developments That Led Them There.

Annaliese Dempsey





## ABSTRACT

At the end of the Second Anglo-Dutch War, the Dutch forces executed a surprising and effective raid on the English naval dockyard at Chatham, burning a large portion of the English fleet and hastening the close of the war. This military action took place during a period of change in naval warfare with the adoption of the line-ahead, and during a war in which the Dutch naval forces were at a disadvantage in terms of both size and firepower. This paper analyzes the developments in naval technology, including ships, firepower, and tactics, by looking at the motivations and events of the Dutch attack on the English dockyard at Chatham. After an account of the raid, an analysis of different characteristics of both fleets will be given. These characteristics will put the events of the raid into a context that reveals major trends concerning both nations, their fleets, and the wars they fought with each other.

## ON CHATHAM, CANNON, AND SHIPS OF THE LINE

*De Ruyter's defensive strategy provides perhaps the classical example of the intelligent and effective use of inferior resources to baffle and checkmate an opponent with superior strength. (Jones 1988)*

Throughout the second half of the 17th century, the Dutch and the English were frequently at war over the controlling rights of their trade interests. The three Anglo-Dutch wars were fought primarily at sea, and as such may be examined as prime examples of naval warfare during the age of sail (Konstam 2011). The Anglo-Dutch wars also coincided with a shift in naval battle tactics, and the conflicts reveal the timeline of cause and effect that occurred with this shift. During the Second Anglo-Dutch war, the Dutch had to contend with England's stronger, more heavily armed fleet, which had adopted the line-ahead naval tactic. This tactic favored the English navy as it allowed heavy English firepower to be utilized to its fullest. In order to circumvent these challenges, the Dutch admiral Michiel de Ruyter developed a brave and ingenious

plan that would lead Dutch ships up the English river Medway to debilitate the English fleet moored at the Chatham dockyard. This move resulted in the largest naval defeat experienced by the British in their history, and ended the war in favor of the Dutch. Analyzing the Dutch raid on Chatham allows for comparison of the two fleets in a unique way, and sheds light on certain characteristics of naval warfare during the age of sail.

This paper will analyze the developments in naval technology, including ships, firepower, and tactics, by looking at the motivations and events of the Dutch attack on the English dockyard at Chatham. An account of the raid will first be given, followed by an analysis of different characteristics of both fleets. These characteristics will put the events of the raid in context, which will reveal major trends regarding both nations, their fleets, and the wars they fought with each other.

## THE SECOND ANGLO-DUTCH WAR AND THE RAID ON CHATHAM

The Second Anglo-Dutch war took place following the Restoration of the English monarchy, and lasted for two years, 1665-1667. The English





government was suffering greatly financially, and was dealt two severe blows with the spread of the plague and the great fire of London. To save money, the king ordered almost the entire English fleet laid up at the Chatham dockyards with no crew in 1667, even though the country was still technically at war. Although Charles II was ostensibly in peace talks with the Dutch Republic, he was also negotiating with France, seeking an ally against the Dutch. While the Dutch forces had been successful thus far in the war, wartime severely disrupted Dutch trade, and so a quick end to the conflict was sought. A plan was put forward to destroy the lightly guarded English fleet while it was moored, defenseless, at Chatham. Most Dutch naval commanders objected to the plan, and were convinced of its eventual failure; the English possessed superior firepower, and the river required complex and skilled navigation due to numerous shoals. Despite overwhelming objection, however, Dutch commanders agreed to follow through with the offensive maneuver. On June 10, 1667, Michiel de Ruyter led Dutch troops as they stormed, and captured, the fort at Sheerness, the only fort defending the river Medway, which was still unfinished at the time (Smith 2012). The only defenses standing in the way of the Dutch fleet were temporary ones, hastily put in place by English officials when the Dutch fleet was already in sight (Smith 2012). The fort at Sheerness was defended only by a small amount of rapidly placed batteries, and a cross-river boom - a chain spread across the Medway meant to stop an invading fleet (Smith 2012). The Dutch fleet entered the river on June 11, and on June 12 broke through the cross-river boom and a line of abandoned blockships that had only just been put into place by the English (Konstam 2011). The Dutch arrived at Chatham on June 13, and, once there, the Dutch forces burned or ran aground several English warships, and towed three back to the Provinces, including the first rate ship of the line *Royal Charles* (Konstam 2011). This action against the English forced Charles II to sign the Peace of Breda in July, 1667, which, although unfavorable for the English, was a much more middle-ground treaty than the Dutch might have pushed for (Konstam 2011). This simple, yet risky, move was a very strong blow to both English forces and morale, especially since all English citizens along the Medway bore witness to the Dutch

fleet towing the pride of the English navy back to the Provinces as a war trophy.

### THE LINE-AHEAD

To fully understand the differences between the English and the Dutch fleets, it is important to first examine the major shift in naval tactics that had occurred during the First Anglo-Dutch war - a shift that was fully established by the time the second war began. With the transition from rowed galleys to sailing men-of-war came different tactical problems and solutions. The new, square-rigged, heavily armed, wooden ships (that would develop into ships of the line) moved on one axis, and fired at a right angle to their trajectory, which is known as firing broadside (Palmer 1997). This development brought new problems to the traditional melee engagement of warfare at sea, as it was quite difficult to maneuver squadrons of vessels in a way that utilized the firepower of all of them, while minimizing the risk of friendly fire. This meant that during the First Anglo-Dutch war, engagements at sea were "chaotic and frustrating", and led to the adoption of the line-ahead tactic by the English, which was fully implemented by the beginning of the Second Anglo-Dutch war (Palmer 1997). While there was a large amount of literature regarding tactics for fighting on land, the recentness of the adoption of men-of-war meant a lack of literature regarding engagements at sea. Naval commanders were in entirely new territory, and had to develop their tactics without any aid from historical accounts. The line-ahead developed quite by accident, and involved naval vessels engaging the enemy in a straight line, lined up bow to stern. While the line-ahead made controlling the fleet in battle more difficult, it increased order and discipline, enhanced fighting capacity, and gave each vessel a clear line of sight, which maximized their firepower (Palmer 1997). By the beginning of the Second Anglo-Dutch war, the English had developed tactics to address the communication problems inherent with the line-ahead. These tactics relied greatly on the uniformity of their navy, however Dutch ships were far less uniform, and, as a result, the Dutch navy could not successfully solve this problem. As such, the Dutch forces did not adopt a fully linear battle tactic; instead, the fleet would form a snaking line, keeping the center squadron, and thus the command ship, farther from





the enemy than the rear and the van (Palmer 1997). From the time it was fully adopted by the English in 1653 onwards, the line-ahead resulted in increased battle efficacy, which led to more ships captured or destroyed by English forces in the following years (Palmer 1997).

### CONSTRUCTION AND FIREPOWER

By the time of the Second Anglo-Dutch war, the basic fighting unit of both fleets was the ship of the line, in which large batteries of guns were carried broadside, and which were powered only by square-rigged sails (Konstam 2011). While both navies shared this vessel as their main weapon in naval battles, the ships differed in most aspects of construction and armament, which stemmed from the different needs of each nation as they developed their fleet. The English fleet developed from the large galleons of the Elizabethan era, in which firepower was all-important, and speed and maneuverability were sacrificed for strength. The Dutch fleet, however, evolved from the need to protect merchant ships on long trans-oceanic voyages, as well as the shallow nature of the Dutch coast and ports. This meant that Dutch ships needed a long range, but a very small draw of water, making them lighter and faster than their English counterparts (Konstam 2011).

Dutch ships belonged to provincial navies, as officials from each province in the Netherlands made up the governing body of the country. They were small, drew no more than fifteen feet of water, and were used as merchantmen when not in active military service (Konstam 2011). Before 1664, and the beginning of the Second Anglo-Dutch war, the Dutch navy was made up of merchant ships hired by the provinces, which meant the Dutch had no purpose built warships. After 1664, Dutch naval officers insisted on having at least a core squadron of warships built specifically for this role, and so Dutch shipyards began construction on vessels designed solely for the navy (Jones 1988). Going into the Second Anglo-Dutch war, the Dutch had a brand new fleet of warships, which was augmented by converted merchantmen. The purpose built Dutch warships were two deckers, and carried 60-80 guns (Konstam 2011).

The construction of the ships of both fleets did not vary greatly, except in speed and durability. In less than a year, Dutch shipyards could build

what it took the English at least two to accomplish (Konstam 2011). Although part of this was due to the higher level of efficiency and financial backing in the provinces, part resulted from the way Dutch shipbuilders cut certain corners when constructing their vessels. The Dutch used a square transom, the stern, lighter materials, and often a lower quality of timber. All of these reduced time and costs, but led to vessels that were much more vulnerable to gunfire (Konstam 2011). While all of the English dockyards and anchorages had deep-water access, making large ships of the line a possibility and commonality, Dutch ships needed to draw much less water for access to their respective provincial ports (Jones 1988). To compensate for the necessary shallow draught, Dutch shipbuilders constructed their vessels with a wider beam, which created a very stable gun platform, regardless of conditions at sea (Konstam 2011). English ships carried a massive amount of firepower relative to the Dutch fleet, and, even when the number of guns carried by ships from both navies was similar, the English fleet was able to carry a much larger caliber on average, due to the size and strength of their warships. The English also valued firepower over maneuverability and speed, and intentionally designed their warships to maximize their gun capacity. Dutch ships simply were not able to carry the heavier guns that were standard on English vessels, although the lighter guns on board Dutch ships did have a higher rate of fire. Comparing two flagships, one from each fleet, provides an obvious example of the stark differences in firepower. The *Maas*, one of the largest warships during the Second Anglo-Dutch war, was used as Michiel de Ruyter's flagship and had a total broadside firing weight of 745 pounds. The *Royal Charles*, however, which was the Duke of Abermale's flagship in 1666 during the Four Days Battle, had a total broadside firing weight of 885 pounds. Initially, one might assume the *Royal Charles* was simply much bigger than the *Maas*, as English ships were frequently bigger than Dutch ones, but the number of guns on each ship tells a different story. The *Maas* carried eighty guns, while the *Royal Charles* carried only 82. The vast difference in broadside firing weight between the two ships comes from the sheer size of the guns that the *Royal Charles* was able to carry: twenty 42-pounders, six 32-pounders, twenty-six 18-pounders, and thirty 9-pounders. Compare





this to the weight of the guns carried by the *Maas*: twelve 36-pounders, sixteen 24-pounders, fourteen 18-pounders, twelve 12-pounders, and twenty-six 6-pounders, and suddenly the difference in firepower becomes much more obvious.

While the English preferred to burn and sink enemy ships, the Dutch preferred to board and capture; but, with the English adoption of the line-ahead tactic, their heavier ships, and larger guns, it became very hard for the Dutch to utilize this tactic. The Dutch commanders seemed unable to blend fire and disruptive tactics, and were unable to effectively switch from line to melee combat when possible. A Dutch naval victory was dependent on breaking the English line, but any Dutch ships that came close to this objective suffered heavy damage they could not sustain, and so a successful tactic was never developed against the English line (Konstam 2011).

It was in the face of these difficulties that Michiel de Ruyter developed his plan to attack the English navy while it lay at anchor. This plan nullified all the strengths of the English navy, while placing the Dutch in a strong position from which to negotiate the end of the war.

## CONCLUSION

Given this difference in firepower it seems surprising that the Dutch were not simply blown out of the water. Instead they held their own against the English through a combination of superior seamanship, better leadership and strategic planning, innovative tactics, and a certain amount of luck (Konstam 2011).

Although the war was going well for the Dutch by 1667, it was disrupting trade and the Dutch navy was suffering heavy damages with each victory, so decisive victories at sea were scarce. Since the Second Anglo-Dutch war was one primarily fought at sea, Dutch commanders had to think outside of the military box for the swift end to the war they were hoping for. The attack on the Medway was brilliant in its simplicity, as it utilized the strengths of the Dutch navy while virtually eliminating every weakness. The Dutch navy relied on their superb seamanship, their light and fast ships, and their ingenuity, while undermining English naval strength by refusing to battle for the end of the war on the open sea, where the English navy had the most advantages. The

infamous and incredible firepower of the English fleet was also nullified, as the Dutch chose to attack what was virtually a ghost fleet, unmanned and with guns silent. The Dutch forces also brilliantly reinforced their victory by towing three first rate ships of the line from the English dockyard, one being the pride of the fleet, the *Royal Charles*. The English were forced to watch their ship, bearing their monarch's royal crest, as it was dragged behind the Dutch fleet, only to be scrapped for timber once in the Provinces. The victory was as much a psychological one as a military one, and King Charles II signed the Treaty of Breda less than a month after the loss of his royal flagship (Levy 1999). It remains the greatest naval defeat ever suffered by the British, and is a remarkable example of Dutch ingenuity in fighting, and beating, a much larger and stronger force through an unconventional method; a method which showcases Dutch seamanship during the Golden Age of the republic in one of its finest forms.



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# Naked Mole Rats and the Cure for Cancer:

The Function of Hyaluronan

Zahia Siab



24







## ABSTRACT

Hyaluronan, a sugar molecule, is present in all mammals and is the chief component of the extracellular matrix. It is crucial for cell proliferation and migration. The hyaluronan molecule present in naked mole rats is different to that in humans. It is five times larger and naked mole rats produce much more of it than humans do. These attributes of the naked mole rat hyaluronan molecule have a beneficial effect on the animals: they are resistant to cancer. The naked mole rat hyaluronan molecule acts as a protective 'cage' around the cells, preventing them from proliferating too much, and thus preventing the formation of a cancerous tumour. Their ability to prevent cancer has the potential to be replicated in humans through the development of a cancer treatment.

Naked mole rats have recently been the subject of much scientific study for a whole host of reasons. They are the longest living rodents in the world, with a lifespan of more than 30 years (Keane, Craig et al. 2014). They are the only known mammals that live in a eusocial society with a queen, workers and soldiers (Editorial 2011). They are specialised to living in an underground environment, in total darkness, at low oxygen levels, and have no pain receptors in their skin (Kim, Fang et al. 2011). However, one of the naked mole rat's most remarkable attributes, and one which has many potential benefits for humans, is their resistance to cancer (Yang, Zhang et al. 2013). Since cancer affects about 300 000 people in the U.K. every year (MacMillan 2011), and there is no permanent overarching cure, finding out how the naked mole rat is able to prevent cancer could drastically change cancer treatments for humans. Thus, observing the naked mole rat and its anti-cancer abilities could potentially lead to the development of a cure for cancer. The aim in this paper is to investigate what makes the naked mole rat resistant to cancer, and to what extent this knowledge could be used to create a cancer treatment for humans.

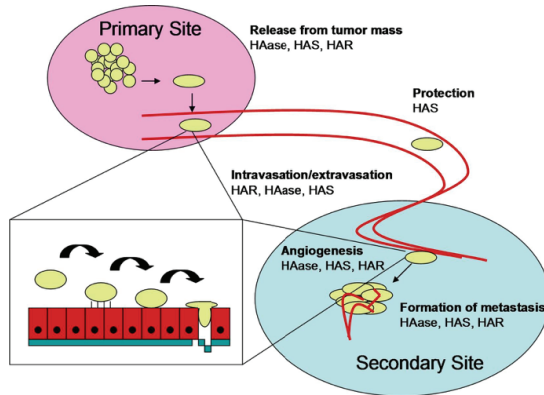
All cancers contain six common traits which categorise them as cancers. Cancers can: stimulate their own growth, resist inhibitory signals, resist programmed cell death, multiply indefinitely,

stimulate the growth of blood vessels, and invade local tissue and spread to other sites (Hanahan and Weinberg 2000). These traits are what make cancer such a deadly and destructive disease. Cancer is caused by mutations in genes which control cell growth. These mutations can occur in oncogenes or in tumour suppressor genes. Oncogenes are genes which regulate the growth of cells within the body. A mutation in the oncogenes will therefore cause cells to proliferate rapidly. Eventually, these proliferating cells will form a cancerous tumour (Krontiris 1995). Similarly, a mutation in the tumour suppressor genes will also cause a tumour to be formed. These genes are responsible for controlling cell division and cell death. If these genes are mutated, and a cancer cell grows in the body, controlled cell death (apoptosis) will not occur because the tumour suppressor gene is non-functional, and is unable to initiate the destruction of the cancer cell. Thus, a tumour will be formed (Vile 1989).

One of the molecules that has an effect on the development of tumours is hyaluronan. Hyaluronan is a sugar molecule that is present in all mammals. It is produced by fibroblasts and is the chief component of the extracellular matrix, thereby helping to provide structural support to tissues. Furthermore, hyaluronan is also important for cell proliferation and cell migration. Because of this, it can contribute

to the spreading of cancer as can be seen in Figure 1. Hyaluronan molecules have anti-adhesive properties which allow tumour cells to be released from the primary tumour mass. They then allow these tumour cells to access lymphatic and vascular systems, causing them to be relocated to a secondary site where they can continue to proliferate and spread (Almond 20007).

However, the hyaluronan molecule in naked

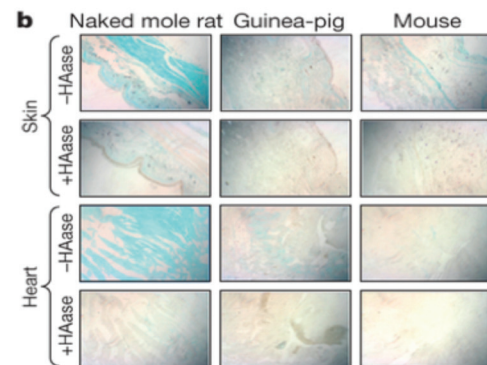


**Figure 1:** Diagram shows how a tumour cell can be released from the main tumour mass at the primary site and be transported to a secondary site with the help of hyaluronan.

mole rats is different to that in humans. It is five times larger, and naked mole rats produce more of it than humans do (Gorbunova, Seluanov et al. 2014). Furthermore, naked mole rats do not possess hyaluronan degrading enzymes (whereas humans do produce these enzymes) and so the hyaluronan molecules are present within the body for a longer period of time (Seluanov, Hine et al. 2009, Tian, Azpurua et al. 2013).

The heavier, longer type of hyaluronan molecule

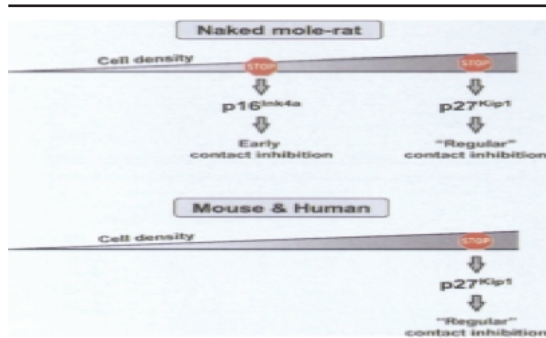
that the naked mole rats possess is very useful. The molecule forms a sort of 'cage' around each cell, which prevents contact inhibition (Seluanov, Hine et al. 2009, Tian; Azpurua et al. 2013). Contact inhibition is a mechanism designed to prevent cells from over replicating. If there is a lot of free space around the cell, then the cell can continue to proliferate until this space has been filled. However, cancer cells no longer have this mechanism, and replicate in an uncontrolled way even though they are in contact with other cells. This uncontrolled replication eventually causes a tumour. The cells of the naked mole rat, however, are surrounded by this hyaluronan 'cage', which means that they do not come into contact with each other. The hyaluronan also acts like a trigger for contact inhibition (Gorbunova, Seluanov et al. 2014). Due to this effect, the naked mole rat cells proliferate much more slowly and become contact inhibited at a much lower cell density to humans. Additionally, naked mole rat hyaluronan has an extremely high molecular mass, which arrests the cell cycle by preventing mitogenic signalling. This, therefore, prevents the formation of tumours (Gorbunova, Seluanov et al. 2014). Naked mole rats do also have the regular contact inhibition that humans possess (see figure 3). This is initiated by the p27 gene, which produces a cell cycle inhibitor protein. However, the cell density has to be extremely high for this gene to be activated, meaning that by the time it is activated it is usually too late: the tumour has already been formed. However, naked mole rats also have an extra failsafe mechanism, which is the p16 gene (see figure 3). This gene is activated in the naked mole rat by hyaluronan when the cell density increases to a certain amount. The p16 gene is a tumour suppressor gene that regulates the cell cycle,



**Figure 2:** The hyaluronan molecules in these three species are stained blue. The naked mole rat has more blue colouring than the guinea-pig and the mouse, which means that it contains more hyaluronan. Furthermore, the blue colouring is more pronounced in the first and third panel, where no hyaluronan degrading enzymes are present. Compared to the other two species, the naked mole rat produces much more hyaluronan even when there is no degrading enzyme present (Tian, Azpurua et al. 2013).

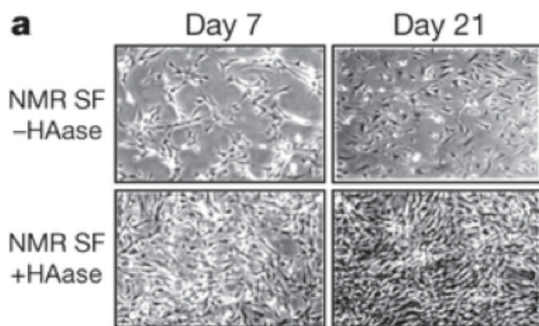


so after it is activated by hyaluronan it allows the tumour cells to undergo apoptosis, hence the cancer is removed [Seluanov, Hine et al. 2009].



**Figure 3:** As the cell density in the naked mole rat increases, early contact inhibition is initiated by the p16 gene and so cell proliferation is stopped. However, humans only have regular contact inhibition that is controlled by the p27 gene [Seluanov, Hine et al. 2009].

In their paper, Tian et al discovered that naked mole rat cells could become cancerous if their HAS2 gene was blocked. This gene is important for the encoding of the hyaluronan molecule, and so if it is blocked, the naked mole rat is unable to produce hyaluronan and will thus develop cancer. Additionally, if the hyaluronan degrading enzyme is overexpressed, the cells of the naked mole rat will also become cancerous. This is because overexpression of hyaluronan causes it to be broken down and degraded. Therefore, due to the lack of hyaluronan, the cell becomes cancerous [Tian, Azpurua et al. 2013].



**Figure 4:** The top images show that without the hyaluronan degrading enzyme there is a constant amount of cell present at day 7 and day 21. However, when the hyaluronan degrading enzyme is added [bottom images] the number of cells rapidly increases. This is because there is a lack of the hyaluronan molecule and so cell proliferation becomes unregulated [Tian, Azpurua et al. 2013].

In order to develop a cure for cancer that humans can use, more research must be done into creating a longer hyaluronan molecule in humans, as well as into developing early contact inhibition. In their paper, Seluanov et al discuss future plans to try to prevent cancer in mice by genetically engineering them with the naked mole rat hyaluronan molecule [Seluanov, Hine et al. 2009]. If this is successful then perhaps their research will be used to initiate trials in humans. However, at the moment no real human trials have been done due to a lack of funding, even though the possible introduction of longer hyaluronan molecules into humans has great potential. In a previous study, a similar sugar molecule was used to treat arthritis [Adams 2013]. This shows that developing a longer hyaluronan molecule for humans is feasible and that it has a lot of potential to be a successful treatment therapy. With more funding and research, scientists may be able to look into a way of creating a drug that contains the longer hyaluronan molecules, which can destroy tumour cells in the human body and prevent them from metastasising. There may also be a way to make human cells express the longer hyaluronan molecules indefinitely so that humans can also be cancer resistant [Adams 2013]. Additionally, scientists may be able to research how to initiate early contact inhibition in humans, which will provide us with a failsafe mechanism to destroy clumps of cells before they become tumours, similar to that of the naked mole rat [Seluanov, Hine et al. 2009].

The unique characteristics of the naked mole rat have allowed for great advancements in medicine to occur. Most notably, the potential development of a new treatment for cancer seems promising. However, in order to utilise this knowledge of the naked mole rat's anti-cancer properties, the scientific community should start moving towards applying the current available research to human models. It is only through the use of human trials that the suspected benefits of the naked mole rat hyaluronan molecule can truly be observed, and thus be used as a potential cancer treatment. Unfortunately, conducting such trials and developing treatments are very expensive and so it may be a long time before the remarkable traits of the naked mole rat are translated into a cancer cure for humans.





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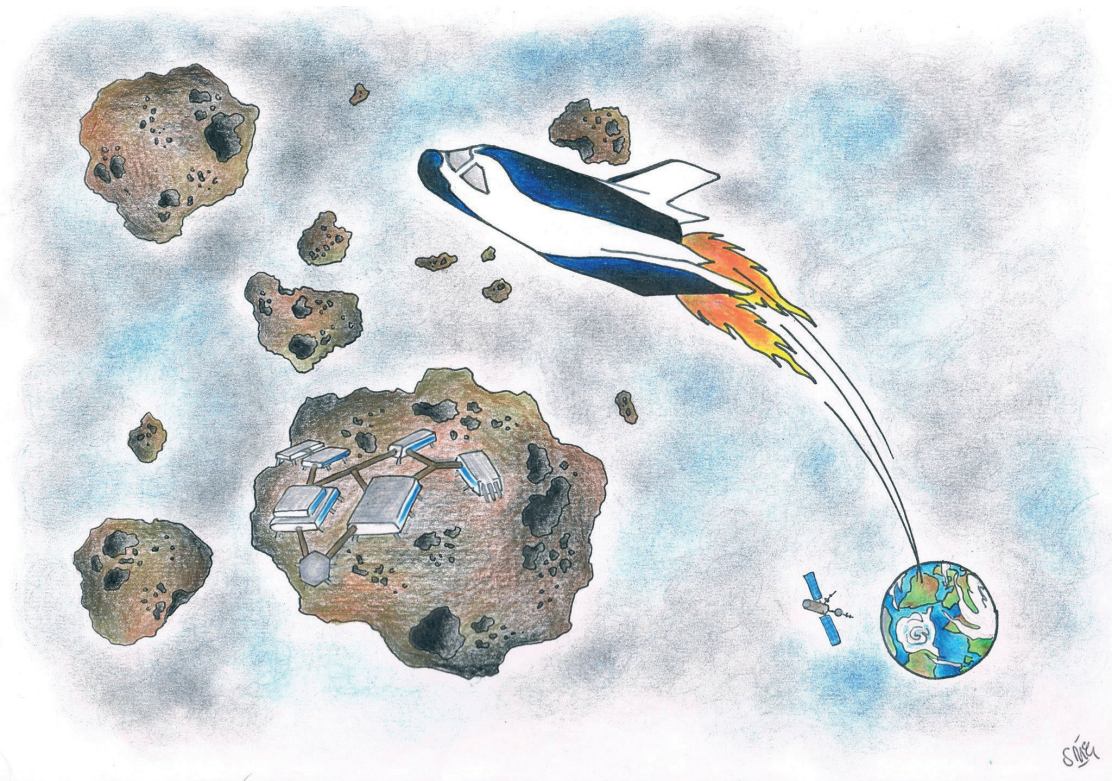






# Societal Impact of Asteroid Mining

Stefan Seuleanu



by Sanna McGregor, AUC Student





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## ABSTRACT

Through its unparalleled economic potential and abundant resource base, asteroid mining is a major step in the cultural transformation from a civilization confined to living on one planet towards a multi-planetary space-faring society. By maintaining a consistent commercial interest in space, space infrastructure would slowly develop to the point that we have permanent settlements in space and the essential ability to defend planet Earth from asteroid impacts. This perspective can reshape the perception of space as a special interest pursuit, and transform it into an accessible and affordable possibility. Entrepreneurs who see the economic opportunities of the asteroid mining venture are investing in technologies that will facilitate a future space economy. Reusable rockets and advanced space telescopes are the first commercially feasible technologies needed for the identification of potential asteroids targeted for mining. The probable cultural outcomes of the large scale implementation of such technologies will be explored by analyzing their distinctive characteristics. The expansion of planet Earth's resource base, by tapping the rare metals found in asteroids, could redefine the present technological and economical capability. Ultimately, these transformations will propagate through culture, transforming it into a space-oriented culture.

Major economic and exploratory endeavors transform the mindset and the cultural direction of a society. The California Gold Rush and the Apollo Space Program are two significant examples. The Gold Rush created the proper economic environment for the expansion of the railroad system, improvement of steam engine technology and the development of new mining methods<sup>1</sup>. The impact that these advancements had on the collective American ethos by energizing the electorate, stimulating new governmental policies, and creating a popular vision of prosperity, can be appreciated by considering the exponential decline in the price of rail transportation, the availability of rapid conveyance between important American cities, and the major economic boom that redefined the notion of national growth<sup>1</sup>. Another radical shift occurred during the Apollo Space Program. Although the main motivation behind the race to the Moon was the Cold

War between the United States and the Soviet Union, achieving manned space exploration reshaped the way people thought about their national identity, their home planet, and, more importantly, their future. During that period, The Comprehensive Clean Air Act, The Clean Water Act and The Endangered Species Act were passed. DDT was banned, the catalytic converter was implemented, Earth Day was established, and both the Environmental Protection Agency and the organization Doctors without Borders were founded. In the same respect, the vision of the Earth from the vantage point of the Moon utterly transformed the collective consciousness of the current generation<sup>2, 15</sup>. These examples briefly showcase the importance of bold adventures on the human psyche. The emergence of companies like Planetary Resources, Deep Space Industries and Stott Space gives an indication that the next major space venture will be asteroid mining. Due





to its massive economical potential, extensive research and planning for mining asteroids has been done since the 1950s. Various academic sources explore the outcomes that asteroid mining may have on a cultural level<sup>3, 5, 7, 12, 15</sup>. However, a detailed analysis of the potential results has not been presented. Given that major exploratory accomplishments have revolutionized the cultural direction of society in the past, it is important to have an extensive view of the potential effects of asteroid development. Rocketry systems and space telescopes will continue to improve due to future demand caused by the asteroid mining industry. The probable changes in economic dynamics, educational systems, green energy, and manufacturing will be evaluated by analyzing the new developments of the aforementioned technologies.

In the last ten years, the space industry has witnessed the emergence of private space companies and the commercialization of space. Founded in 2002, SpaceX is a private company that currently designs, manufactures and launches rockets and spacecraft into Low Earth Orbit (LEO) and Geosynchronous Orbit (GEO). Their long term vision is to enable humans to explore and, eventually, live on other planets<sup>17, 18</sup>. Because they are continuously reducing the price of space transportation and advancing research in rocketry delivery systems, SpaceX was awarded NASA's contract for resupplying the International Space Station in 2008<sup>20</sup>. This was a historic moment for the space industry, as SpaceX was the first privately owned company that was capable of delivering cargo into LEO<sup>21</sup>. Since June 2010, the Falcon 9 Rocket has been delivering cargo into LEO for around 4109 dollars per kg<sup>19</sup>, at 56.5 million dollars per launch<sup>22</sup>. To put that in perspective, United Launch Alliance offers the Atlas V rocket for LEO cargo delivery, which costs around 13812 dollars per kg and 125 million dollars per launch, while EADS Astrium Space Transportation offers the Ariane 5ES rocket, with estimated costs of 10476 dollars per kg and 220 million dollars per launch<sup>23</sup>. The SpaceX commitment to lowering space transportation prices can be appreciated by exploring their current projects, namely: the Falcon Heavy rocket and the Grasshopper rocket. Falcon Heavy's goal is to deliver a 53000kg payload into LEO, compared to 13150kg for the Falcon 9, with cargo costs around 2200 dollars per kg and launch costs between 77 million and 135 million dollars<sup>19, 22, 24</sup>. These

characteristics will make the Falcon Heavy the most powerful and cost effective rocket for transporting cargo into LEO and GEO. Falcon Heavy is in the final stages of development with its first official launch expected in 2015<sup>24</sup>. Meanwhile, the Grasshopper project will explore the potential of reusable rockets. According to SpaceX, the use of fully reusable rockets will reduce the cost of space transportation by a factor of 100<sup>25</sup>. In addition, the Grasshopper rocket will be able to launch again after landing in under 24 hours<sup>25</sup>. The goal of the three stage Grasshopper reusable rocket is to deliver payloads into LEO for as little as 22 dollars per kg<sup>25</sup>. Although still in development, the Grasshopper rocket has had seven successful test flights so far, demonstrating vertical stability, pad return landing, and lateral deviation control<sup>26</sup>. The ultimate vision of SpaceX founder and CEO, Elon Musk, is to facilitate the development of a space industry that can transport humans into LEO for affordable prices<sup>25</sup>. This capability could change the general perception of space as a special interest pursuit, and generate a new view in which space becomes accessible to the general public<sup>13, 14</sup>.

The asteroid mining venture will be greatly facilitated by the development of reusable space rockets. As the cost of space payload delivery drops, asteroid mining companies will be able to launch more asteroid tracking, prospecting, and mining spacecrafts, which, eventually, will lead to the rapid development of space infrastructure. Historically, there are three factors that drove human exploration: conflict, the prospect of fame and glory, and the prospect of financial or resource gain. In contrast to the motivation for the Moon race, asteroid mining is seen as a very profitable venture<sup>7</sup>. This industry is loosely estimated to be worth hundreds of trillions of dollars<sup>5, 14</sup>. The reason behind this economic potential is asteroid composition, which includes many components from water to rare metals. There are three types of asteroids: C-type Carbonaceous, M-type Metallic, and S-type Stony. The C-type Carbonaceous asteroids make up 75% of all asteroids. On average, a carbonaceous asteroid contains up to 20% water, 30% metals (Fe, Ni, Co and PGMs ÷ Platinum Group Metals), 50% silicates and other elements (C, CO, N, S, Si, F). Water is used in the production of rocket fuel which consists of liquid hydrogen and oxygen<sup>2, 8, 9</sup>. PGMs are required in at least a quarter of all manufactured





goods, ranging from electronics (TVs, cell-phones, PCs, etc.) to advanced medicines (anti-cancer drugs)<sup>27,28</sup>. Due to differential gravitational settling, all PGMs that planet Earth had at the time of its formation, sunk to the center of the Earth. Therefore, the largest PGMs mines on Earth are old impact craters of asteroids that contained PGMs. Also, mining 1kg of PGMs requires, on average, a time span of 5 months and a considerable amount of energy<sup>29</sup>. For these reasons the market prices of these metals are very high. Consequently, PGMs are excluded as much as possible from the manufacturing process of every company<sup>29</sup>. For example, PGMs are essential in the production of solar cells, and the transformation of petroleum into gasoline and other related petrochemical products<sup>28</sup>. The energy sector, which has a large role in the global economy, is considerably influenced by the low availability and high cost of PGMs. In this regard, the global economy is partly shaped by the high demand and low supply of these resources. However, a 500m carbonaceous asteroid can be worth up to 5 trillion, and could contain more PGMs than have ever been mined in the history of humanity. The PGMs concentration of any near Earth asteroid (NEA) is at least 100 times larger than the PGMs concentration on planet Earth<sup>3,8,29</sup>. The most accessible objects for resource mining in space are the NEAs. The fact that 18% of the total number of NEAs require less energy to visit than visiting the Moon is an indication that our present technology meets the requirements of such a challenge. Moreover, 58% of the NEAs require less energy for a round trip with cargo than a round trip from the Moon with the same cargo<sup>29</sup>. For example, one NEA that the space industry has recognized as a possible target for mining is 2011 UW158. This asteroid has a size of 1011m by 452m, a synodic period of 1.9 years and an estimated value of between 300 billion dollars and 5.4 trillion dollars<sup>16</sup>. That means that mining operations can be launched every 1.9 years.

Similar to mining on Earth, the phases of asteroid mining are: detect, prospect, claim, mine, and deliver. Considering our current technological level, asteroid rendezvous are perfectly feasible. Driven by the perspective of considerable economic gain, private companies will continue to develop their space oriented technologies, which will facilitate the venture of asteroid mining<sup>16</sup>. A proposed plan for cost-effective asteroid mining for water and PGMs

examines the delivery of NEAs prospectors into orbit to identify and gather data on potential targets using SpaceX Grasshopper rockets (once available). After identifying the perfect mining candidate, the second step is to rendezvous with the asteroid and deploy the robotic mining equipment, hydrolysis equipment, solar panels, filling tanks and inflatable transporters using the Falcon 9 rocket or the Falcon Heavy rocket. Using solar energy, the asteroid is heated up to the point that water is vaporized. A hydrolytic unit subsequently collects the water vapor and transform the components into liquid hydrogen LH2 and liquid oxygen LOX. LH2 and LOX are used as rocket propellants that can refuel the rocket for delivering the cargo back or be left in space for fueling stations. Apart from fuel, water can also be used for radiation shielding, cleaning equipment, and life support<sup>10,11</sup>. Meanwhile, PGMs have the highest melting point in the periodic table. One way to mine the PGMs is to bag and heat the asteroid the only remaining solid state elements of that asteroid are the PGMs. After regolith separation, the PGMs can be delivered to Earth, or can be kept in space for developing space infrastructure such as Lagrangian space stations. Once in LEO, the PGMs can be brought to Earth by using Bigelow Aerospace inflatable transporters<sup>3,4,5,6,12,16</sup>. If such a venture were to succeed, our global economy would be significantly influenced by the space industry. There is the possibility that there will even be a rather larger number of people living and working in space than on earth. The general consensus in the space industry is that commercial asteroid mining will accelerate human expansion into space<sup>3,15</sup>.

Nonetheless, any business-oriented space activity is still largely problematic because of its somewhat unquantifiable risk, high initial investment, long term return, lack of infrastructure, and unregulated economic environment. Space law is a new field of law that tries to regulate the use of resources, commercial disputes, ownership, espionage, and military engagement in space and so on. Due to the fact that space laws are still to be drafted, many private companies are reluctant to engage in economic space activities. However, companies like Planetary Resources are already developing multiple spacecrafts for asteroid identification, mapping, tracking, prospecting, and, ultimately, mining. Planned for launch in 2015, the Arkyd 100 LEO space telescope will





be the first privately owned spacecraft sent into space with the specific purpose of facilitating space resource mining. The purpose of Arkyd 100 will be to identify, map, and track NEA for future mining. The difference between Arkyd 100 and other space telescopes is the increase in efficiency, the low manufacturing cost, the “doubling on systems” and the “swarm” approach. In 2013 Planetary Resources announced that they are planning to launch at least 100 space telescopes in 2015, with the number increasing in the following years. The distinct characteristics of the Arkyd telescopes will be that they are small and lightweight, are designed for mass production, can communicate using optical LASER technology, and incorporate the latest A.I. for autonomous operations and diagnostics. The Arkyd 100 will have a resolution of 1-2 meters, weigh 12.7kg, and have an estimated manufacturing cost of 4 million dollars<sup>16</sup>. To put that in perspective, the Rapidline commercial telescope, launched in 2007, had a manufacturing cost of 40 million dollars and a resolution of 6.5m<sup>16</sup>. These new perspectives would make it possible for almost everyone on planet Earth to use a space telescope for their own needs, fast, and at a very low cost, because the Arkyd 100 will be both used for asteroid identification and for Earth or space observation. This will have a considerable impact on educational methodology, especially in science-related fields. For example, a geography teacher can use the Arkyd 100 to show his students, in real time, specific mountain formations, or certain regions that are important for that class, while a physics teacher can demonstrate different experiments using the observational data gathered by the telescope. Schools all around the world can commission an Arkyd 100 for their experimental or observational educational tasks. In the same respect, the Arkyd 100 can be hired by different companies for surveillance, mapping, observation, etc. Science projects that cannot yet be pursued due to expensive space telescopes will be possible with the launch of low cost commercial telescopes. The first step towards asteroid mining, namely the launch of Arkyd telescopes, can potentially influence the worldwide scientific, economic, cultural, and educational direction by providing technologically superior telescopes at affordable costs<sup>3, 16, 29, 30</sup>.

Recent advancements in rocket cargo delivery in LEO and space telescopes are an indication of the future transformation in the relationship between the

general public and the concept of space. Low cost payload delivery systems and intelligent autonomous space telescopes are essential for the jump start of the asteroid mining industry. Asteroid mining has the potential to enable the start of a significant space economy; possibly larger than Earth's current economy. The anticipation of a massive space economy and industry emergence is generally caused by the large resource backbone that exists in space and by the past indications of exponential growth in other domains like the airplane industry or the Internet industry. As the space economy develops, space infrastructure will develop as well, leading to an ideological shift in people's relationship with space. In the near future, the most probable outcome is that the space industry and infrastructure will be largely built by autonomous robots. Progressively, with advancements in artificial gravity, there is the potential to have people working and living in space. As Konstantin E. Tsiolkovsky, founder of cosmonautics, stated, “the Earth is the cradle of humanity, but humankind cannot stay in the cradle forever”<sup>31</sup>. With the potential development of the asteroid mining industry, the notion of the human race as an interplanetary spacefaring species will start to be ingrained in the human psyche. The one-planet limitations in economy, in experimental environments, and in resource diversity will probably be surpassed, and new forms of creative art, technology, and ideas will start to emerge. The popular mindset will be more future-oriented, creating an innovative culture that will probably have weekly headlines of scientific findings, engineering breakthroughs, or exploratory discoveries. Space will probably become our new society.





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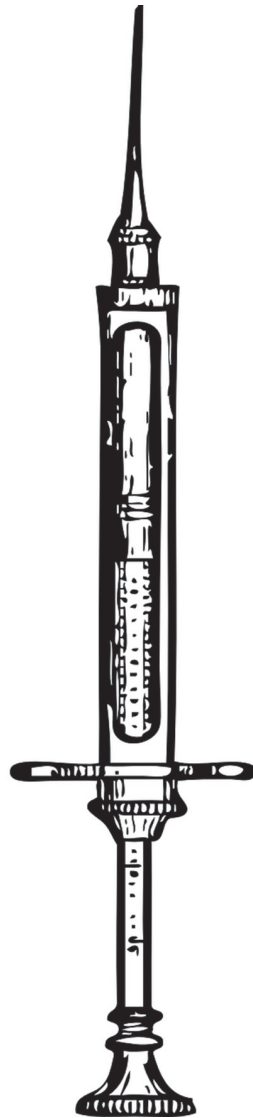




# Cocaine Vaccine:

A New Method to Prevent Relapse in Addicts

Miriana Stamenkovic





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## ABSTRACT

Research into immunotherapy against drug addiction, including cocaine addiction, has been conducted since the 1970s. Different types of vaccines have been created and tested, resulting in the first human trials. This paper gives an overview of the different available vaccines and their shortcomings by reviewing the available literature on the subject of the history and development of cocaine vaccines. Active vaccinations consisting of a cocaine adjuvant bound to an antigen that elicits an immune response are used. These vaccines induce the production of anti-cocaine antibodies that bind the cocaine molecules before they cross the blood-brain barrier. Vaccines currently being researched include: a cocaine adjuvant bound to keyhole limpet hemocyanin, cocaine-bovine serum albumin conjugate, a third generation cocaine hapten known as GNE, and succinyl norcocaine covalently bound to cholera B toxin. The latter has reached phase II clinical trials, although individual immune responses among participants in the research can vary greatly. To ensure high enough antibody levels in addicts, repeated booster vaccines are necessary. Different tactics are used to increase the efficacy of the vaccines, such as: using the genetic profile of the patient, combining different haptens with antigens in order to increase the amount of antibodies that are produced in response to vaccination, and combining the cocaine vaccine with enzymes that metabolize cocaine. Further research into improving the efficacy of cocaine vaccines is necessary, but the possible implications of creating an anti-addiction vaccine must be considered in terms of under which circumstances the vaccine may be administered, to protect the free will of patients.

Cocaine is a very addictive substance, and the number of cocaine addicts is very high (2.5 million in the United States as of 2007 (Martell et al 2009)). In 2013, there were an estimated 1.4 million cocaine users in the United States alone (Maoz et al 2013). One third of all drug-related hospital visits in 2009 (emergency department) involved cocaine abuse (Martell et al 2009). This makes cocaine addiction a major public health problem (Cai et al 2013), and means it has large economic and social effects (Martell et al 2009). A recurring problem in addicts trying to overcome

their addiction is relapse (Cai et al 2013). It has also been shown that "stress, drug-associated cues, and brief exposure to the drug itself can trigger drug craving and relapse to drug use in humans" (Wee et al 2012). Currently, there are no FDA (US Food and Drug Administration) approved pharmacotherapies to treat cocaine dependence (Cai et al 2013); however, research into immunotherapy to combat drug abuse has been conducted since the 1970s; immunotherapies for heroin, morphine, nicotine, methamphetamine and cocaine are under development (Wee et al 2012).





It is believed that anti-cocaine vaccination could aid substantially in maintaining abstinence in addicts who are otherwise prone to relapse (Kosten et al 2013). This paper aims to give an overview of the cocaine vaccines that are currently in clinical trials, how they elicit their effects, and their ability to prevent relapse in addicts.

## COCAINE VACCINE

The method of action through which cocaine exerts its effects is the binding of cocaine to dopamine transporters in the putamen caudate (basal ganglia) and ventral striatum regions of the brain, which inhibits dopamine reuptake and causes an accumulation of dopamine in the synaptic cleft, leading to cocaine's rewarding effects (Maoz et al 2013). Cocaine is a very small, lipid soluble molecule that is capable of crossing the blood-brain barrier very quickly; "it takes about six seconds to pass from the lungs to the blood to the brain" (Seppa 2011). This makes the development of an anti-cocaine vaccine difficult, as there is a very short time frame for the vaccine to act before cocaine elicits its effects. Several antagonist and agonists aimed at disrupting the neurological effects of cocaine at its site of action in the brain have been explored in the past, but these did not yield positive results (Cai et al 2013).

The main method of action of the different cocaine vaccines today is a therapeutic one, this approach

*engages the addictive drug before crossing the blood-brain barrier, before it stimulates the drug reinforcement and reward pathways, [it] would have the advantage of blocking the effect by specifically targeting the drug itself and not impacting normal downstream CNS signaling pathways (Maoz et al 2013).*

Anti-cocaine antibodies bind to cocaine in the blood, and thus inhibit the drug's binding to dopamine transporters in the brain. In humans, 47% of the dopamine transporters needs to be bound to cocaine for the effects of the drug to be felt (Maoz et al 2013), which helps with the development of cocaine vaccines as not 100% of the consumed cocaine has to be bound in the blood. As drug addicts are known to use larger quantities of drugs of abuse due to tolerance, it is important that the antibodies that are used are present

in high quantities and that they have a high affinity for the drug (Wee et al 2012).

There are two different forms of immunization in use, namely, active and passive immunization. Passive immunization involves directly administering polyclonal (Wee et al 2012) or monoclonal (Maoz et al 2013) antibodies that can bind to cocaine. This method is mainly directed at treating overdose because the body does not have to produce the antibodies first, which allows for a very fast response rate (Maoz et al 2013). As of 2013, passive immunization has not yet been tested in humans (Maoz et al 2013). Active vaccines are more interesting as the protection they offer lasts longer than passive immunization, and they are capable of inducing immunological memory (Wee et al 2012). An active cocaine vaccine consists of a cocaine analog (also known as a hapten (Cai et al 2013)) that is covalently bound to an antigen that elicits an immune response, i.e. the production of cocaine-sensitive antibodies; several combinations have given rise to a variety of cocaine vaccines (Maoz et al 2013; Wee et al 2012). A few examples include a cocaine analog linked to a keyhole limpet hemocyanin, which showed positive results in preventing the reinstatement of response to cocaine in a rat relapse model. Another example is a cocaine-bovine serum albumin conjugate, which was successful in reducing the levels of cocaine in the brain. Using a third generation cocaine hapten, known as GNE, that has been conjugated with capsid proteins of a disrupted serotype 5 adenovirus (called dAd5GNE300), a research group was able to decrease the motivation to self-administer cocaine in rats compared to the control group, when the price (this could be mechanical action or electric shocks for example) for an injection increased (see figure 1) (Wee et al 2012). A vaccine consisting of succinyl norcocaine covalently bound to cholera B toxin has entered phase II clinical trials, and resulted in 38% of the participants producing antibody titer levels that correlated with lower urine tests that tested positive for cocaine, indicating a reduction in cocaine use by participants (Martell et al 2009; Wee et al 2012). There is a "high individual variability in the immune response to vaccines" (Wee et al 2012), which explains why only a part of the participants produced antibody levels high enough to neutralize one or more doses of cocaine. Another issue that became apparent in the phase II clinical study with the cholera B toxin conjugate, was







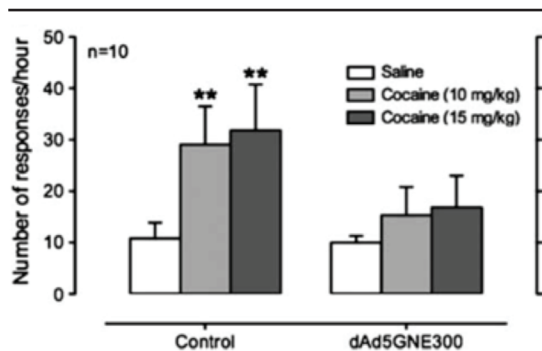
that it took approximately 2 months after vaccination for the patients to produce antibody titers high enough to block one or two doses of cocaine, and that these levels already started to decline 4 months after vaccination (Martell et al 2009). It has been suggested that additional 'booster' vaccinations would be necessary to maintain antibody levels over time. Also, the research group Martell et al 2009 suggests that during the initial 2-3 month period, in which the antibodies are being produced and thus have not yet reached sufficient levels to effectively block cocaine uptake in the brain, addicts need to be retained, or undergo additional treatment to promote abstinence.

### LIMITATIONS AND CURRENT RESEARCH

Due to the issue of inducing, and maintaining, high enough antibody levels to inhibit the neurological effects induced by cocaine, several methods to ensure the improved efficacy of the vaccine are being researched. One tactic is to use the genetic profile of the patient to predict how well the patient will respond to vaccination. As one of the main problems with vaccination is the variety in immunological responses among patients (Wee et al 2012), one way to increase efficacy would be to improve the response to vaccination in those patients that have lower antibody levels. The levels must be "sufficiently high

it has been shown that some users experience more cocaine-induced paranoia than others. This is thought to be caused by a genetic polymorphism in the dopamine- $\beta$ -hydroxylase [D $\beta$ H] gene. This reduces the levels of D $\beta$ H enzyme, which in itself is not only responsible for the paranoia that addicts experience, but also for a greater sensitivity to cocaine's aversive properties, effectively enhancing the effect of the cocaine vaccine and thereby making the vaccine more effective in those patients with D $\beta$ H polymorphism who have lower antibody levels (Kosten et al 2013). The combination of low D $\beta$ H levels with the cocaine vaccine allows "patients with low antibody levels from the vaccine to reduce or eliminate the desire for more cocaine from the cocaine slip" (Kosten et al 2013). And indeed, after a series of experiments, a 35% drop in cocaine urine rates in the group with low D $\beta$ H levels was demonstrated, compared to a 10% drop in the group with the normal phenotype. It was also shown that addicts with low levels of D $\beta$ H experience three times as much cocaine-induced paranoia (Kosten et al 2013).

Another method that is used to increase the efficacy of cocaine vaccines is combining different haptens with antigens in order to increase the amount of antibodies that are produced in response to vaccination, and also to decrease the frequency of the booster vaccinations that are necessary to maintain antibody titer levels. As only one cocaine vaccine has currently entered clinical trials, the research into modifying the hapten used in the vaccine to increase efficiency has been based on the hapten used in said vaccine; namely, succinyl norcocaine (SNC), which is bound to a cholera toxin B subunit (Cai et al 2013). Fluorination of SNC was chosen as the method to enhance vaccine efficacy as it has been shown that either incorporation of fluorine atoms, or substitution with fluorine-containing molecules, could increase binding affinity with the target or even improve immune recognition by enhancing T-cell receptor affinity (Cai et al 2013). Due to the chemical properties of fluorine, incorporation makes it possible to increase T-cell receptor affinity without negatively affecting the structure of the antigen used in the vaccine (Cai et al 2013). Modification of the SNC structure yielded four novel structures, namely, GNF, GCNF, GN5F and GNCl (see figure 2 for structures). The variant GNF was shown to elicit an antibody response that

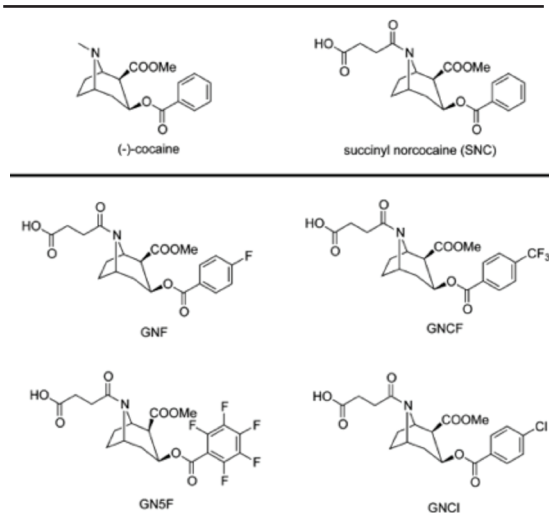


**Figure 1:** Responses for cocaine in rats after a period of abstinence. Wee et al 2012.

[...] to block one to two doses of smoked cocaine. This more modest blockade was considered sufficient to prevent relapse to repeated use and dependence after a single use of cocaine" (Kosten et al 2013). It is likely that these addicts will consume an additional dose of cocaine due to the fact that the effects of the first dose were inhibited by the anti-cocaine antibodies. However,



was 20% greater than that of SNC, and it maintained cocaine affinity compared to SNC [Cai et al 2013]. As a variety in the immunological response in patients - which results in antibody levels that are too low to sufficiently block doses of cocaine in a large portion



**Figure 2:** Structures of cocaine, hapten SNC and halogen-containing cocaine haptens. Cai et al 2013.

of patients - has been a major problem with cocaine vaccines, the fact that mono-fluorination at the 4' position on the benzoyl ring of SNC results in a novel hapten (namely: GNF) is pertinent to the further development of cocaine vaccines [Cai et al 2013].

The combination of a cocaine vaccine with enzymes that metabolize cocaine has been used in an attempt to create a more effective treatment to combat relapse in cocaine addiction. The reasoning behind this combination, as explained by Carroll et al (2012), is: "[i]t remains uncertain whether either enzyme or cocaine antibody alone can be sustained at clinically useful levels throughout the initial months of abstinence when risk of relapse is highest. For that reason we considered combining these two therapeutic approaches for enhanced effectiveness". The cocaine metabolizing enzymes that are administered are based on either bacterial cocaine esterase or on human plasma butyrylcholinesterase, and the latter is used to produce cocaine hydrolases (CoH) [Carroll et al 2012]. These cocaine hydrolases are capable of catalyzing the metabolism, and subsequent excretion, of cocaine at a much higher

rate and have been used to treat relapse in cocaine addiction independently of cocaine vaccines [Carroll et al 2012]. In order to ensure high levels of the production of CoH that circulates in the blood, gene-transfer vectors such as helper-dependent adenoviral vectors are used [Carroll et al 2012]. It has been demonstrated that after a single treatment, circulating enzyme levels in the blood were maintained for "a year or more" and, when tested on rats that had been in a situation of forced abstinence, that high enzyme levels were successful in preventing novel drug-seeking behavior (and thus relapse) for up to six months [Carroll et al 2012]. It was found that CoH was equally effective at hydrolyzing cocaine, whether it was found to be free in the blood or bound to an anti-cocaine antibody. This shows great promise for the success of a combinatorial therapy, as the cocaine molecules are prevented from entering the brain by two substances on two fronts [Carroll et al 2012]. Several experiments were conducted and it was established that gene transfer and immunization can occur together without negatively effecting either enzyme or antibody response, which makes a potential future therapeutic application achievable [Carroll et al 2012]. Furthermore, an enhancement of protection from relapse when combining CoH with a cocaine vaccine points to additive effects, or even synergistic effects, of the two approaches. As CoH is derived from human plasma butyrylcholinesterase, other variants based on this enzyme are being synthesized to have greater catalytic potential, which would make it possible to achieve a greater suppression of the rewarding effects of cocaine while simultaneously using smaller doses of the enzyme [Carroll et al 2012]. Lastly, it must be noted that the cocaine vaccine that makes use of the capsid proteins of a disrupted adenovirus cannot be used in combination with gene transfer of CoH, because the immune responses that are generated by this vaccine are not compatible with gene transfer [Carroll et al 2012].

## DISCUSSION

It is clear that cocaine vaccines are effective in reducing the frequency of relapse in struggling addicts, although current vaccines need much improvement in the area of additional vaccinations to ensure that antibody titers are sufficiently high for a prolonged period of time. However, a hypothetical



issue must be raised, especially as these vaccines are currently in an early stage of development: if the development of cocaine vaccines reaches a point where just one series of vaccinations would be sufficient to prevent cocaine from having any neurological effects for a longer period of time (e.g. a number of years), the ethical issue of preventative vaccination should be raised. This preventative vaccination could take on several forms. For one, parents could opt to vaccinate their children when they reach puberty, a period where the risk of developing addiction is higher. But by doing this the parents are depriving these young individuals of their free will to experiment with drugs. It must be noted that a higher risk of developing addiction does not imply that addiction will surely develop. Another form of preventative vaccination comes in the shape of vaccinating, or offering vaccination, to those individuals that are known to be genetically predisposed to develop an addiction: the so-called 'risk-groups'. However, it must be noted that a cocaine vaccine would only be able to prevent cocaine addiction, so the individual would remain at risk for the development of an addiction to other substances.

Ultimately, vaccination is the choice of the individual, and in that sense anti-addiction drugs are no different than anti-pathogen drugs. However, if the development of these vaccines reaches a point where preventative vaccination is feasible, the free will of the individual must be considered, and, therefore, the current view on it being the parents' decision to either vaccinate or not vaccinate their children should be reconsidered for this class of vaccines.

The use of active vaccination to combat relapse in cocaine addiction after a period of abstinence shows promise, as it has been shown that relapse can increase the craving for the drug and thus make a renewed period of abstinence more difficult to obtain and maintain (Wee et al 2012). The development of cocaine vaccines is an on-going project in which there is still ample room for improvement because there is a two to three month period after initial vaccination during which antibody levels are not sufficiently high enough to block the effects of cocaine. Another problematic area that can still be improved upon is the length of time between booster vaccinations, which is preferably as long as possible and is now approximately four months (Martell et al 2009).

Several different approaches are being taken to improve current cocaine vaccines. Among them are combinatorial therapies with cocaine metabolizing enzymes, improving cocaine haptens, and including the genetic profile of the patient in treatment. Currently, the only cocaine vaccine that has reached clinical trials consists of succinyl norcocaine bound to a cholera toxin B subunit, however, only 38% of the patients produced sufficiently high antibody titer levels (Cai et al 2013, Martell et al 2009). Naturally cocaine vaccines are currently mainly being aimed at those addicts that have shown willingness to abstain by enrolling in a program that aids in overcoming addiction, but future application in other patient groups should be considered, both practically and ethically. Because there are currently no FDA approved pharmacotherapy approaches to treat cocaine addiction, the further improvement of cocaine vaccines is of vital importance to providing medical support to a large group of people suffering from addiction who are currently enrolled in a program, but are struggling through cycles of abstinence and relapse (Cai et al 2013).



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# Illusion of Iranian Infitah

Marijn Mado



by Yin Hsieh, AUC Student

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## ABSTRACT

It seems apparent from monitoring current affairs that since the election of the so-called reformist president Rouhani, Iran has been opening up and strengthening its international ties. This paper seeks to explore whether this sudden Iranian *infitah*, open door policy, is accompanied by a decrease in authoritarianism, allowing more freedom to the Iranian people. On the one hand, according to Pratt's theory, Iran's monolithic identity, and hence authoritarianism, is challenged by international contacts who introduce different perspectives. On the other hand, according to Bellin's perspective, international economic cooperation may reinforce robust authoritarianism, for rich fiscal health and sufficient international support contribute to Iran's coercive apparatus. Besides, within Iran's borders the conservatives, led by ayatollah Khamenei, are firmly in power, restraining Rouhani's influence, impeding his promised social reforms, and setting strict religious ground rules for civil society. In addition, Iran's recent economic downfall due to international sanctions is clearly compatible with both Rouhani's and Khamenei's discourse emphasising economic development. While the question of Rouhani's sincerity remains unclear, the opening up of Iran focuses on economy rather than personal freedom, and will most likely stimulate the regime's coercive apparatus and reinforce robust authoritarianism.

Is the political and social climate in Iran on the move? Since the election of president Rouhani, a so-called reformist politician, in August 2013, an Iranian version of *infitah*<sup>1</sup> seems to be taking place. Rouhani's election promise to warm up international ties is currently reinforced by multiple news reports of collaboration between Iran and several countries (Rasmussen, 2014). Examples include collaboration on technology projects with Japan, Russian investments in Iranian oil projects, strengthening of military ties with China, and a Europe-Iran business forum in London ("Japanese minister", 2014; "Russia", 2014; "China", 2014; "The 1st Europe-Iran forum", n.d.). Rouhani's discourse

focuses on the opening up of Iran again and again, for example when he calls for the opening up of Iranian universities to foreign students, and the establishment of a department taught completely in English (Moghtader, 2014b). This paper seeks to explore whether this sudden move towards openness in Iran is accompanied by a decrease in authoritarianism, allowing more freedom to the Iranian people.

On the one hand the increase in international cooperation provides for less authoritarianism, as international contacts are beneficial for breaking down the us/them binary. Nicola Pratt (2007) explains that the us/them dichotomy is part of an ideological

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<sup>1</sup> *Infitah* literally means "opening up", or "open door" policy. *Infitah* denotes the shift (mainly taking place in Sadat's Egypt) from nationalist socialist policies to open door policies with a foreign focus (Pratt, 2007, p. 20).





complex that underpins the system of rule (p.14). In order to move away from authoritarianism, Pratt argues that a country not only needs to implement reforms, but primarily needs to accept a new world view (p. 19). Furthermore, authoritarian regimes will take measures that deny differences within the country in order to maintain a fixed identity (Pratt, p. 15). Taking the example of art, in Iran its "higher purpose" is to "create patriotic unity", and art that creates division in the country is banned (Rasmussen, 2014). Censorship in a closed country may be easy to maintain, but international contacts will challenge this monolithic identity by introducing different views. Hence, by advocating international cooperation, Rouhani combats a conservative worldview and paves the way for less authoritarianism. According to this perspective, opening up Iran through international collaboration should be beneficial for the personal freedom of Iranians.

On the other hand, international economic cooperation may just as well reinforce robust authoritarianism. According to Eva Bellin (2004), two main factors that contribute to the robustness of the coercive apparatus are rich fiscal health and sufficient international support (p. 144). Both fiscal health and international support networks are immensely important for the security establishment, and therefore for the continuity of authoritarianism (Bellin, p. 144). At the moment Iran is experiencing economic decline due to international sanctions over Tehran's nuclear program (Dareini, 2014). It is therefore in Iran's interest to warm up international ties in order to enhance its own economy. Evidently, the main objective of the Europe-Iran business forum is "to prepare for post-sanctions investment and trade" ("The 1st Europe-Iran forum"). Similarly, due to looser visa policies, fewer restrictions on embassies, and funds for hotels, there is a massive increase in tourism (Dareini). The increase in international cooperation is indeed quite beneficial; not for breaking down the us/them barrier, but for ensuring a financial foundation to sustain the military of Iran's coercive apparatus (Bellin, p. 144).

This discrepancy leads one to question what is happening within Iran's borders. Internationally Iran

may be seeking to form ties, but if Iran were truly opening up, individual Iranians would be allowed more freedom through a decrease of authoritarianism. However, Rouhani's second election promise - to grant more freedom to civil society - has failed, as the journalist Rasmussen has claimed (2014). According to the journalist Balali, "there has been little sign of social reforms inside Iran" (2014). New York Times reporter Erdbrink speaks repeatedly of the "naïve enthusiasm that Iran was changing" (2014). Admittedly, although Rouhani's government has tried to take a more moderate position in domestic affairs, the conservative parliament and judiciary that are under the leadership of ayatollah Khamenei have too much power, and will resist making any substantial changes in civil society. Multiple examples in recent news reports reveal a pattern of Rouhani's government objecting to a tight measure while in practice nothing changes, as the security establishment carries out the will of the conservatives in power<sup>2</sup>. The promised changes can be quite deceptive and disappointing for individuals in Iran, who mistakenly think Iran is changing (Erdbrink, 2014). A security official exemplified this apparent power struggle between liberals and conservatives when he arrested an activist and said: "We are arresting you to make clear that there won't be any change in this country" (Erdbrink).

The conservatives led by Khamenei undoubtedly determine Iran's domestic affairs, consider, for instance, the recent parliamentary bill. Due to this law, which allows vigilantes to enforce Islamic morals, citizens who take it on themselves to enforce sharia law are legally protected. Clearly, this will create a situation that both Rouhani and moderate Iranians openly resent (Balali, 2014). In short, this example indicates a move towards a more religious, conservative, civil society. In addition, Rouhani's power in domestic affairs appears to be limited to publicly disagreeing with parliamentary policy, since he seems unable to pursue any solid change. Meanwhile, Rouhani is able to advocate, and provide space, for international cooperation without being significantly impeded by Khamenei and the conservative elite. Admittedly, Khamenei has challenged the warming up

<sup>2</sup> For example: "Iran's jailing of activist offers hint of liberty under Rouhani" (Erdbrink, 2014), "Iran president denounces bill to empower Islamic vigilantes" (Balali, 2014) and "Row harder Rouhani: hopes failed for Iran's jailed reformist" (Rasmussen, 2013).







of international ties by his openly hostile disposition towards the United States and Britain, and disapproves of any Western influence in the region (Moghtader, 2014a; "Khamenei," 2014). In general, the conservative hardliners are not very considerate of international ties in their interactions with other countries<sup>3</sup>. Nevertheless, in comparison with the strains that are put on Rouhani in the domestic domain, this opposition seems marginal. While trying to explain this apparent discrepancy the question arises as to whether there is really a polar power struggle going on, or if Rouhani's and Khamenei's interests are in some way interconnected.

Moreover, what is it exactly that both parties are rooting for? In the same speech in which he denounced the law empowering vigilantes and called for less religious violence, Rouhani said: "I want to see our parliament's actions resulting in more unity, more cohesion, and more jobs for our young people. No vice is above joblessness, poverty and lack of opportunity to a good education" (Balali). Notably, this discourse focuses on economic issues again, leaving the expansion of individual freedom and human rights unmentioned. In comparison, due to Iran's dependence on decreasing oil revenues (oil lost a quarter of its value between June and October 2014), Khamenei states that Iran's economy will become dependent on major powers ("Oil reliance," 2014). So far, even though Western countries were not eager to support Iran after the Islamic revolution, oil resources ensured international support and fiscal health, and so sustained Iran's authoritarian regime (Bellin, p. 148). Consequently, both Rouhani and Khamenei are rooting for alternative sources of income. According to Khamenei, "Instead of relying on its mineral resources, Iran should rely on the talent and potential of its youth" ("Oil reliance"). Both Rouhani and Khamenei particularly emphasize Iran's economic development (and, remarkably, both mention Iranian youth) in their discourse and actions. Hence, it could well be that the opening up of Iran is initiated by Iran's recent economic downfall due to international sanctions. In order to secure fiscal health and international support, it is credible that Khamenei is allowing Rouhani to play

a charismatic and moderate role towards the outside world. The extent to which Rouhani is truly sincere about his promised political reforms remains unclear.

Meanwhile, Khamenei and the conservative hardliners are making the domestic ground rules clear within Iran, preventing any significant political re-imagination – consider the earlier quotation of the security official. Thus, civil society in Iran cannot expect any reforms due to robust authoritarianism. Furthermore, as Bellin's theory helps to explain, the open door policy may only contribute to the capacity of the regime's coercive apparatus. In comparison, Pratt's thesis of breaking down the us/them dichotomy may not be applicable to predicting a decline in Iranian authoritarianism, but it could hint at the function of Rouhani's moderate and open disposition. Perhaps deceiving the outside world into believing that Iran is reforming stimulates economic cooperation? In any case, in terms of personal freedom, the Iranian *infatih* remains an illusion.

<sup>3</sup> For instance, hard-liners conservatives are quick to blame Saudi Arabia for plotting with the West and Khamenei advises Iraq to not allow any Western forces to combat IS. ("Oil reliance," 2014; "Khamenei," 2014)



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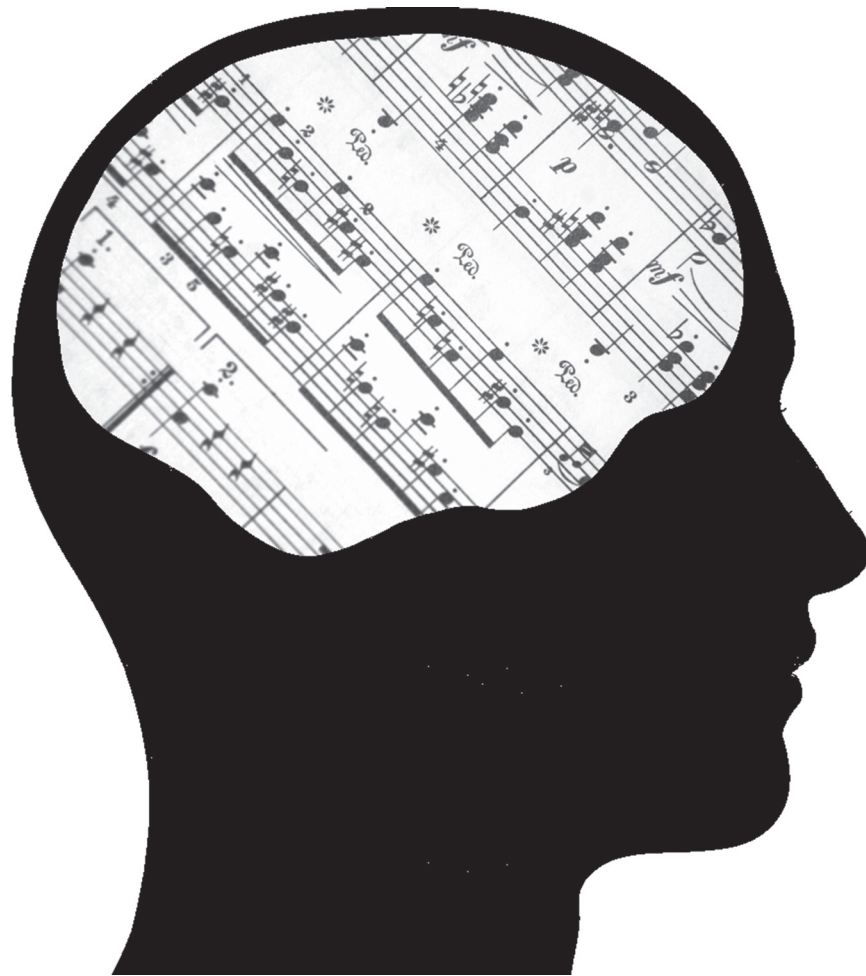




# Why We Enjoy Music

The Neural Mechanisms of Musical Pleasure

Sonja Haedicke





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## ABSTRACT

Despite having no direct evolutionary or biological function, music is among the most rewarding experiences for humans. In recent years, neuroscientists have taken greater interest in exploring the link between music and experiences of pleasure. A chronologically structured overview of findings from neurological studies provides insights into why and how we derive pleasurable sentiments from listening to music. Such research suggests that music activates a complex network of various reward structures in the brain, among them subcortical regions, including most notably the mesolimbic system, the nucleus accumbens and the ventral pallidum, and cortical regions such as the anterior cingulate cortex and the orbitofrontal cortex. One prominent explanation for how these reward structures are activated is through musical expectancy. Listeners form expectations about the musical development of a piece, which can lead to feelings of reward if these expectations are met. Advanced knowledge of the neurotransmitter systems and brain pathways involved in music perception can help researchers and practitioners understand why and how music can induce pleasurable experiences.

The presence of music has been documented in all human cultures since prehistory (Mas-Herrero, Zatorre, Rodriguez-Fornells & Marco-Pallarés, 2013). One of the main reasons why people listen to music, making it so prevalent across cultures, is because it conveys and triggers emotions (Menon & Levitin, 2005). People's experience of "chills", a pleasant feeling associated with a particular pattern of autonomic nervous system arousal, and their valuation of music as one of the most enjoyable activities in life are indicators that music can produce profound feelings of pleasure (Salimpoor et al., 2011). What differentiates music from other pleasure-producing stimuli – and thus makes it so intriguing – is that it has neither a direct biological and evolutionary function (like food and sex do) nor a concrete basis, comparable to drugs or monetary rewards (Salimpoor et al., 2009; Chanda & Levitin, 2013).

While many a music listener might know from personal experience that music can induce pleasure,

current research in neuroaesthetics aims to explore the underlying neurological mechanisms that result in such perceptions. Earlier findings of a link between music listening and emotion have inspired more focussed research into the link between music and the experience of pleasure. This strand of research suggests that music activates reward structures in the brain. One explanation for how these reward structures are activated is through musical expectancy. This essay will give a chronologically structured overview of findings from neurological studies that provide insights into why and how we derive pleasurable sentiments from listening to music.

## MUSIC, EMOTION, AND PLEASURE

There is a direct link between emotional arousal and pleasure response to music, but researchers face a major challenge in their attempts to study this relationship: even though there are certain core emotions (see Ortony & Turner, 1990, for a review





of research on basic emotions), complex emotions are felt subjectively and thus differ from individual to individual. Measuring the physiological response of the autonomic nervous system appears to be the most objective measure of musical pleasure, although it does not allow pinpointing of the accompanying emotion (Salimpoor et al., 2009). Presumably the most intense responses to music are 'chills' in which the pleasurable experience of music is accompanied by a physiological component. Such 'chills' express themselves in changes of heart rate, muscle activity, and respiration (Blood & Zatorre, 2001), as well as in electrodermal activity (skin conductance), body temperature, and blood volume pulse (Salimpoor et al., 2009, 2011). Because 'chills' have such a distinct physiological basis, they are often used as an objective measure of the pleasure response to music (Salimpoor & Zatorre, 2013).

The effect music has on our body can not only be observed in terms of physiological responses, but also in terms of neurological responses in the brain. One of the first neuroimaging studies to investigate emotional response to music found dissociation between brain structures involved in music perception, the affective component of music processing, and other emotion processing (Blood et al., 1999). Listening to dissonant and consonant musical pieces activated paralimbic and neocortical regions, areas associated with emotional processing (*ibid*). Since then, neuroimaging research has established that music can activate virtually all limbic and paralimbic structures of the brain (Koelsch, 2010).

Inspired by these earlier findings of a link between music listening and emotion, a recent interest has grown into investigating pleasure as a response to music listening. The feeling of pleasure is generally assumed to derive from positive emotions; however, research has shown that music perceived as sad can induce satisfaction just as well (Chanda & Levitin, 2013). This suggests that it is important to make a distinction between emotion and pleasure. Only in recent years do researchers seem to have taken this difference into account, a development that can, in part, be ascribed to the fact that studies have repeatedly identified brain systems – such as the mesocorticolimbic system – that are involved in reward, but not necessarily in emotional processing, and can be activated by music.

## REWARD STRUCTURES IN THE BRAIN

Humans tend to repeat behaviours that have been successful in the past, because we experience the achievement of rewards as something positive and pleasurable (Zatorre & Salimpoor, 2013). Researchers distinguish between reward-search, including anticipation and goal-directed behaviour, and reward-obtainment, the actual perception of pleasure (Chanda & Levitin, 2013). As such, there is an 'appetitive' phase of anticipation, and a 'consummatory' phase of hedonic properties and their reinforcement. "The subjective feelings of reward are mediated by the mesocorticolimbic system, the core of which consists of the ventral tegmental area (VTA), the ventral striatum, including the nucleus accumbens (NAc), the ventral pallidum, and the prefrontal cortical areas that include the anterior cingulate cortex (ACC) and the orbitofrontal cortex (OFC)" (*ibid*, p.181).

These structures are linked via dopaminergic and glutaminergic pathways. The VTA projects to the NAc, amygdala and hippocampus, as well as to the prefrontal cortex (especially the orbitofrontal and ventromedial cortices and the ACC) via dopaminergic pathways; glutamine mediates between the amygdala, hippocampus and prefrontal cortex to the NAc (Haber & Knutson, 2010; Salimpoor & Zatorre, 2013). Release of dopamine and endogenous opioids in these areas, especially in the projection from the VTA to the NAc, is associated with the experience of both phases of reward (*ibid*; Menon & Levitin, 2005). Dopaminergic activity in the VTA has previously been linked to other pleasure-inducing stimuli, for instance addictive drugs, money and desirable consumer goods, and winning videogames (Haber & Knutson, 2010; Salimpoor & Zatorre, 2013).

The hippocampus is involved in memory, while the amygdala plays a prominent role in arousal and emotional processing. The prefrontal cortical areas are involved in abstract thinking, integration of emotions, and synthesis of past and present processes to create expectations and anticipation, as well as in assigning a value to a reward (*ibid*). Neuroimaging studies over the past century have established that the experience of reward involves an intricate neural network (Haber & Knutson, 2010). The dopaminergic system is assumed to have evolved initially to reinforce evolutionary adaptive behaviour by giving reward; however, humans have learned to stimulate it through other means, one of them being music.





## ACTIVATION OF REWARD STRUCTURES THROUGH MUSIC

A number of neuroimaging studies have found evidence that music activates reward structures in the brain, particularly the ventral striatum. The first evidence of an activation of mesolimbic structures came from the Blood and Zatorre (2001) study, in which participants' physiological and neural (PET) response to self-selected chill-inducing music – in contrast to other participants' music (rated as neutral) – was measured. Subjective reports of pleasure correlated with changes in physiological activity (indicating emotional arousal) as well as with blood flow changes in structures implicated in reward and emotion. Increased activity in response to chills intensity was measured in the ventral striatum (with the nucleus accumbens), midbrain, amygdala, orbitofrontal cortex, and ventral medial prefrontal cortex, areas known to be activated by other euphoria-inducing stimuli.

Another PET study investigated passive listening responses to unfamiliar (pleasurable) music (Brown, Martinez & Parsons, 2004). Even without the task of deliberately processing and rating emotions while listening, as is usually asked for in such studies, the researchers found activity in limbic and paralimbic structures, including the hippocampus and the ventral striatum, suggesting that music evokes emotions spontaneously.

The first study to employ fMRI in order to investigate musical pleasure measured participants' BOLD (Blood Oxygenation Level Respondent) responses to researcher-selected classical pieces and their scrambled dissonant version (maintaining musical structure) (Menon & Levitin, 2005). Due to its higher spatial resolution, the fMRI findings provided concrete evidence that music listening stimulates activity in mesolimbic structures involved in reward processing, including the nucleus accumbens and the ventral tegmental area, as well as the orbitofrontal cortex, and the hypothalamus and insula (areas involved in regulating autonomic and psychophysiological responses to rewarding and emotional stimuli). The researchers also investigated the interconnectivity of these structures, finding a strong link between the mesolimbic reward network, specifically the NAc and VTA, and distinct frontal regions (OFC and the inferior frontal cortex). These

findings provide evidence for a strong connectivity between affective and cognitive systems as basis for the pleasure response to music. Koelsch et al. (2006) partly replicated these findings, observing increased BOLD signals in the ventral striatum, insula, and the inferior frontal gyrus, which is implicated in musical analysis and working memory.

While many studies have found activation (Blood & Zatorre, 2001; Brown et al., 2004; Menon & Levitin, 2005; Koelsch et al., 2006) and interconnectivity (Manon & Levitin, 2005) between reward-associated structures, only one study to date has directly tested the involvement of dopamine in response to musical pleasure – in this case self-selected chill-inducing musical excerpts. Salimpoor et al (2011) combined PET and fMRI to investigate both the temporal and spatial dimension of dopamine release, in addition to physiological measures of autonomic activity. They found that [11C]raclopride binding decreased during pleasurable music listening in mesolimbic regions (caudate, putamen, and NAc), indicating an increased dopamine release during pleasurable music listening. What is more, they observed “increased activity during anticipation [...] and decreased activity during peak emotional response [...] for the caudate, but a continuous increase in activity in NAcc with a maximum during peak emotional responses” (Salimpoor et al., 2011), providing evidence for dopaminergic activity even when no ‘chills’ (extreme pleasure responses) are experienced. A particularly interesting finding is that the anticipation and actual experience of a musical reward trigger dopamine release in distinct structures of the striatum (the caudate and the NAc). The caudate is highly interconnected with sensory, motor, and associative areas of the brain; it is thought to play a role in stimulus-response associations and the reinforcement of rewarding stimuli (ibid).

An older study by Goldstein (1980) showed that opiates play a role in musical pleasure, as some individuals who had been injected with naxolone, an opiate receptor blocker, experienced fewer and less intense “chills” in response to music. However, as only 3 out of 10 participants showed a limited response, and as this is the only study to investigate this process to date, it is clear that further research is eagerly anticipated.

Research has thus established that music





not only activates emotional processing centres of the brain, but also specific structures implicated in reward, and that these interact with each other. The VTA and the NAc take a central role in the experience of musical pleasure, but reward arises through the interconnectivity with, among others, the amygdala, hippocampus and prefrontal cortex.

### REWARD AND MUSICAL EXPECTANCY

Research has brought forward a number of explanations for the origin and purpose of the activation of the reward system through music. Music is thought to not only have a direct neural influence, but to indirectly stimulate pleasure through its social value (for a summary, see Koelsch, 2010, Box 1). A framework by Juslin and Vastfjäll (2008) suggests several ways in which music evokes emotions, one of them being through musical expectancy. This interesting trend builds on the ideas introduced in Meyer's much-cited book *Emotion and Meaning in Music*. Meyer suggests that the emotional response to music arises because individuals continuously form (mostly unconscious) expectations about the musical temporal development (Krumhansl & Agres, 2008). The idea seems intuitive as music does not proceed in a simple sequential manner, but is characterised by changes in beat, pitch, volume, and so on. According to Meyer, there are three different sources of expectations: extra-opus knowledge about general patterns of a musical style, intra-opus knowledge about the characteristic development of a musical piece, and universal Gestalt principles of musical perception (e.g. expect small changes in pitch) (*ibid*). "It has been proposed that all individuals have a "musical lexicon", which represents a storage system for musical information that they have been exposed to throughout their lives" (Zatorre & Salimpoor, 2013, p. 10434).

That listeners do indeed form expectations when listening to music has been confirmed in several studies. Reaction time studies show that listeners respond faster when their expectations about melodic development are met, and psychophysiological studies have detected changes in ANS response to harmonically unexpected developments (Koelsch, 2005; Krumhansl & Agres, 2008; Salimpoor & Zatorre, 2013; Steinbeis, Koelsch & Sloboda, 2006).

The finding by Salimpoor et al. (2011) that different structures of the striatum are activated

during the 'appetitive' phase of anticipation, and the 'consummatory' phase of the 'chills' experience, suggests that musical pleasure has a temporal basis. As previously mentioned, the caudate is implicated in stimulus-response associations and the reinforcement of rewarding stimuli. Activation of the caudate during anticipation of chills might reflect the association between a particular tonal sequence and a pleasure experience.

The feeling of tension resulting from anticipation is rewarding not in its resolution per se, but rather in the way it is resolved (e.g. an unexpected delay or consonance) (Krumhansl & Agres, 2008). Zatorre and Salimpoor (2013) maintain that "the fulfillment of a prediction leads to dopamine release in the striatum, with a greater response associated with better-than-expected reward" (p. 10435). Support for the idea that musical expectancies and musical pleasure are linked comes from Menon and Levitin's (2005) study, which shows that reward and affective systems, and cognitive and autonomic systems, are strongly interconnected. Besides structures associated with reward, the previously mentioned studies observed activation of the hippocampus, amygdala, and prefrontal cortex. The hippocampus is not only thought to conjure images from past experiences (mental imagery), but also to keep previously heard sound sequences in working memory (Zatorre & Salimpoor, 2013). Auditory events are inherently evanescent, thus memory systems are bound to be implicated in the analysis of a piece's structure. In the prefrontal cortex, past and present processes are synthesised, such that expectations and anticipation can be created. Changes in the pleasure response to different tonal sequences, for example those leading up to a musical peak associated with a 'chills' response, might be linked to activity in the prefrontal cortex as well, as this area is implicated in the assignment of value to a reward. Involvement of the prefrontal areas might thus also explain why we obtain pleasure from a stimulus that does not carry any inherent reward value, in contrast to, for example, stimuli relevant for survival.

It seems that aesthetic appreciation is not only a bottom-up, stimulus-reliant process, but is equally influenced by top-down processes from cortical areas (Salimpoor & Zatorre, 2013). This would explain individual music preferences shaped by previous







experiences (including cultural background) and personality. "Humans appreciate aesthetics because they have the cognitive architecture linking abstract thought and complex analysis to the reward regions of the brain" (Salimpoor & Zatorre, 2013, p.63).

Because music plays such a prominent role in our lives, it seems evident that progress into these fields of research can be useful in many domains. The presented research suggests that music effectively manipulates hedonic states. One way this knowledge is actively put to use already is therapy (see e.g. Gold, Solli, Krüger & Lie, 2009). Advances in the understanding of which neurotransmitter systems and brain pathways are involved in music perception can help design even more effective therapies. For example, music might be used as a therapeutic tool for depression or bipolar disorder. It probably also will not take long until findings in this field will swap over to marketing and consumer research. Linking the pleasure experience of music to certain products would surely prove to be an effective marketing strategy. Music is a mystery – one that research is now slowly uncovering.





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# Concealed Agendas in a Discourse on Human Rights:

Homosexuality, Neo-colonialism, and autonomy  
in a Ugandan Context

Pam van Schie





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## ABSTRACT

The proposition of the Anti-Homosexuality Bill in Uganda in 2009 sparked global controversy, because its contents are considered contradictory to the international declaration of human rights. The Anti-Homosexuality Bill represents a fundamental rejection of homosexuality in contemporary Uganda, but can also be viewed as analogous to a larger issue concerning changes in the economic system, moral framework, and fundamental identity of Uganda under the post-colonial influence of Western countries through a system of development aid. This conflict of identity has incited accusations of Western neo-colonialism by development aid agencies, but, interestingly, none towards parallel influences by foreign agents of evangelical background. Additionally, the Anti-Homosexuality Bill contributed to a wider, populist argument aimed at increasing the support for the autonomy of President Museveni's regime. This overview of the multitude of implicit statements issued through the Anti-Homosexuality Bill contributes to an inclusive understanding of contemporary Ugandan politics, and reveals a complex interplay of power relations involving Uganda, Western development aid agencies, and Western conservative evangelical agents.

Although Uganda gained its independence in 1962, it nonetheless remained under considerable British post-colonial influence. Uganda is also influenced by other forces for political and cultural change towards a neoliberal society, in the form of other foreign agents 'masquerading' under the notion of development aid (Wiegatz, 2010, p. 123-124). This development involved a moral restructuring at the paradigmatic level of Ugandan society. This has led to, and continues to result in, moral contradictions within Ugandan culture, with a fundamental conflict of identity as a prevailing consequence. This political and cultural influence is commonly communicated by its proponents – both the embodiments of Western governments, and NGO's concerned with development aid – in terms of a "freeing of actors and arenas of social interaction from established ('traditional') norms and connotations," (Wiegatz, 2010, p. 126). This has inspired Ugandans, upon confrontation with this process of moral restructuring, to respond with accusations of neo-

colonial, patronizing agendas on the side of these secular Western agents, but interestingly not of parallel influences by foreign actors with evangelical backgrounds.

As proof of the cultural extension of the international development aid system, human rights activists and Western states involved in the development of Uganda have responded critically to the introduction of the Anti-Homosexuality Bill by the Ugandan Parliament in 2009, rebuking it as unlawful under Uganda's previous recognition of human rights (Sadgrove et al., 2012, p. 104), and threatening to eliminate financial aid if it were to be passed. Although currently over 70 countries have laws prohibiting homosexual behavior (Bailey, 2012; as cited in Healy & Kanya, 2014, p. 151), Uganda's Homosexuality Bill contained some of the heaviest penalizing measures, which perhaps clarifies the immensity and intensity of the international response it received. The Anti-Homosexuality Bill proposed capital punishment





for 'aggravated homosexuality' – meaning sexual intercourse with minors and individuals known to be HIV positive – and prison for homosexual intercourse, as well as for the promotion of homosexual activity to others or the failure to disclose such activity to others (Sadgrove et al., 2012, p. 104). This controversy regarding the abiding of human rights Uganda taken into consideration, the public discourse surrounding the Homosexuality Bill ought to be viewed and analyzed as a metaphor for a much larger conflict involving Uganda and its foreign involvement. The Ugandan Bill originates from the widely held view that homosexuality has 'infiltrated' the country as a 'foreign threat' from the West; Western opposition to the Bill is perceived, yet again, as "neo-colonialist pressure" (Vorhölter, 2012, p. 283-284).

In understanding the rationale that lies at the core of the discourse on homosexuality and human rights that inspired, and resulted from, the Bill, it is vital to understand how it symbolizes a bigger dispute: that of the Ugandan internal reinterpretation of national identity under the influence of Western moral impositions, and the internal and external tensions that arise from this (Sadgrove et al., 2012, p. 105). The ubiquitous Ugandan justification of its homophobia through "the conjoining of sexual behavior and material interest" proves how this Anti-Homosexuality Bill is meant to encompass a multitude of criticisms that Uganda wishes to express towards foreign engagement in their national development (Sadgrove et al., 2012, p. 126). However, an additional factor needs to be acknowledged to understand what provoked Uganda to adopt this rhetoric of extensive symbolism. As Anderson (2011) notes, hostility towards homosexuality in Africa and other southern countries is closely related to traditional Christian views, and resistance to more liberal Anglo-European value systems (p. 1602). Increasing support for conservative Christian views, incited by foreign Western missionaries, enhances the notion of homosexuality as a result of Western "moral decay". As a political consequence of this mutual antagonism, homosexuality has become analogous to the tensions concerning Uganda's national (secular) identity under neo-colonial pressure (Sadgrove et al., 2012, p. 110).

A number of scholars have linked the introduction of the Anti-Homosexuality Bill to a three-day seminar in Kampala, Uganda's capital city, a few months

before, titled "*Seminar on Exposing the Homosexual Agenda*," which was run by three influential evangelists from the United States (Bennett-Smith, 2013; as cited in Healy & Kanya, 2014, p. 165; Sadgrove et al., 2012, p. 113; Cheney, 2012, p. 84). As the title suggests, it involved an evangelical conspiracy theory that warns Uganda against Western gay activists, claiming they are out to recruit Ugandan children to join their "lifestyle", and, ultimately, to destroy Ugandan culture (Healy & Kanya, 2014, p. 165). According to Sadgrove et al. (2012), the fact that some of the most conservative members of the Ugandan government attended this seminar caused a parliamentary petition denouncing homosexuality to be filed, which brought about the Anti-Homosexuality Bill (p. 113). Additional evidence for the conservative Christian constitution of the government is that the *New Vision*, which is Uganda's most prominent daily newspaper and is government-owned, "routinely makes alliances between the state and religious leaders highly visible" and, more importantly, "demonstrates significant boundary dissolution between the language of the church and the language of the law" (Sadgrove et al., 2012, p. 113-114).

Although Western governments around the world are gradually accepting homosexuality and same-sex marriage, the issue remains highly debated. Western evangelicals remain in opposition to homosexuality, dismissing it as sinful, and as a threat to the traditional family. As discussed later, the 'family values agenda' that they adopt in their opposition proves highly effective in the context of Uganda. First, however, it must be explained why Western conservative evangelicals have decided to continue their 'culture war' abroad on the African continent. According to Anderson (2011), a "southernization of global Christianity", due to the secularization of the global North, means African countries currently remain predominantly more conservative and committed to the Christian faith (p. 1591). Support for the homophobic views of the religious conservative right in the West is consistently decreasing, and as the core of conservative Christianity now lies in Africa, evangelicals have relocated their efforts to increase support abroad. There, like in Uganda, they are deemed "experts on the 'gay agenda'"; both religious and political leaders bid them an eager welcome, and rely upon this 'expertise' for their knowledge of the homosexual lifestyle (Kaoma, 2009, p. 21). It





seems highly problematic that Ugandans depend on inaccurate information in their education about homosexuality, seeing as these 'expert' views promote the idea of homosexuals as child-molesters recruiting children with an objective to dismantle societies.

Highly problematic indeed, as some scholars argue that these conservative evangelicals do not wish to promote 'traditional family values' for the sake of those that they 'save', but because of an overarching global conflict within the Christian church (Kaoma, 2009, p. 21; Cheney, 2012, p. 92). The global Christian religion faces an internal conflict about the degree of progressive and liberal policy adjustment that is deemed appropriate. The Christian Association for Church Renewal has adopted the objective to "synchronize strategies across denominational lines and to counteract liberal ecumenical groups", which in practice means intensifying bonds with churches throughout the African continent, so as to obtain allies for the Western conservative evangelical's attempt to challenge the liberalization of Christianity in Western countries (Kaoma, 2009, p. 17). Homosexuality is often put up as a "wedge issue" in the discussion, pressurizing African conservative churches to either dismiss it as out of the question, or be considered too liberal (p. 17). This approach, taken by Western conservative evangelicals, is highly effective due to its similarity to the anti-Westernization discourse currently omnipresent in Uganda, which will be elaborated on later. First, it is interesting to recognize how this similarity leads to a paradox in the statement made by the Ugandan government in the form of the Anti-Homosexuality Bill.

In essence, the Western evangelicals are warning the Ugandans for Western developmental donors, because their agenda is to impose Western liberal morals upon Uganda through their economic development aid. This creates a common enemy, and incentivizes Uganda to side with the evangelicals in an attempt to decrease Western imperial influence. The Western evangelical agenda is fundamentally quite similar, as their aim is also to impose their own morals upon Uganda. Somehow, the Ugandan government is willing to adopt the conservative Christian rhetoric in their opposition to Western influence (Sadgrove et al., 2012, p. 114), whereas this rhetoric also originates from Western sources. Cheney (2012) attributes this paradox to the "success of the

colonial-era missionary erasure of Africa's history of sexual diversity" (p. 79). Although actually a remnant of their time as a British colony, the Ugandans have come to consider conservative Christianity, and the rejection of homosexuality along with it, an aspect of their national identity, and are therefore more inclined to perceive the contemporary missionaries as saviors or allies. In contrast, the adversities resulting from neo-colonial impositions bring about a resistance to change, and thereby strengthen the appeal to, and promotion of, this "traditional" identity.

A prevalent argument put forward by Ugandan governmental proponents of the Homosexuality Bill is that homosexuality simply does not exist in Africa, or at least, did not exist until Western liberals brought it there as part of their post-colonial imperial agenda. However, historical records show quite the opposite. In their work *Boy-Wives and Female Husbands: Studies of African Homosexualities* (1998), Stephen Murray and Will Roscoe prove that homosexual behavior was indeed practiced on the pre-colonial African continent; also in Uganda (as cited in Cheney, 2012, p. 80). Interestingly, Western colonists and early missionaries saw it as yet another evidential feature that Africa was uncivilized, and considered its prohibition through colonization the "white moral duty" (Wieringa, 2008; as cited in Cheney, 2012, p. 83). Upon British colonization, the prohibition of homosexuality was legally recorded – a prohibition which endured after its independence in 1962 (Sadgrove et al., 2012, p. 104; Cheney, 2012, p. 80). Both the argument that homosexuality is un-African, and the notion that it is a byproduct of Western post-colonial imperialism, thus appear to rely upon a selective appeal to Ugandan "history", in that its actual history proves it to be incorrect. On the contrary, the homophobia experienced throughout contemporary Uganda is a product of earlier imperialist efforts, and may be accredited to historical colonial influence.

Under post-colonial influence in the 1980s and 1990s, Western moral restructuring in Uganda remained vast, and encompassed widespread adoption of reforms in the political, economic, cultural, and social spheres (Vorhölter, 2012, p. 287; Wiegatz, 2010, p. 123-124). Many of these cultural developments were enabled through the Western development aid approach of offering conditional financial support. This aid was substantial enough to more than double the Ugandan national budget, albeit supplied





under the condition that it was used according to the donor's propositions (Ndikumana & Nannyonjo, 2007; as cited in Vorhölter, 2010, p. 287). This enabled Western donors to not only construct a neoliberal economic system in Uganda, but also to extend the impact of the neoliberal philosophy to all aspects of Ugandan society; this meant that a liberalization and individualization of sociocultural Uganda was required in order for the Ugandan government to receive foreign aid. Reform was therefore eagerly and successfully accepted, causing Uganda to develop rapidly and become the poster child of post-colonial development aid (Kuteesa et al., 2009; as cited in Wiegratz, 2010, p. 123). However, the prompt changes in economic morals – from the original Ugandan cooperative system to a neo-liberal system with an emphasis on individual benefit – led to disorder in market relationships, in moral decision-making, and in the Ugandan identity in general.

As noted before, anti-gay sentiments had already been incorporated into Ugandan culture during the colonial era; this seems highly advantageous to the imperial politics of Western evangelicals, in that the discourse offered by these evangelicals on the theory of the homosexual agenda bears substantial resemblance to concerns about Western intervention in Uganda. As Robert Lorway (2008) states, the strategy employed by the Ugandan government resulting from this evangelical influence associates the alleged homosexual agenda with a host of social problems emerging from the societal changes under post-colonial pressure; this successfully caused a rise in support for the Anti-Homosexuality Bill (as cited in Cheney, 2012, p. 82). These societal changes have affected economic transaction morals and traditional Ugandan family and kinship structures, and are perceived by the Ugandan people as part of a general process of "moral decay" (Vorhölter, 2012, p. 302; Sadgrove, 2012, p. 112). Therefore, the Anti-Homosexuality Bill can be regarded simultaneously as a statement against homosexuality, fueled by Western conservative religious discourses, and as an analogous statement expressing Ugandan concern about the disarray caused in Uganda by Western involvement.

The association that Ugandans established between economic aggravations and malpractice in the name of neoliberalism was eventually partly responsible for the proposition of the Anti-

Homosexuality Bill. *New Vision*, the Ugandan state-owned daily newspaper, claims "Uganda is forced to accept homosexuality due to its aid and economic dependency on the West" (Vorhölter, 2012, p. 302). This economic dependency is already perceived as problematic, as it is believed that neoliberal reform leads to 'immoral activities' (Sadgrove et al., 2012, p. 116). Many Ugandans had high expectations of the advantageous consequences of the neoliberal ideology, and the grounds upon which they were promoted by Western development agents (Appadurai, 1996; as cited in Vorhölter, 2012, p. 287). Nevertheless, with the introduction of a neoliberal economic system, ambiguity arose concerning acceptable trade practices. As modernizing traders eagerly adopted the new neoliberal ideology to the fullest extent, at times meaning that malpractice for reasons of individual benefit ensued, others faced the moral dilemma of having to adapt to this new, more competitive market while trying to hold on to traditional cultural morals of harmony and cooperation (Vorhölter, 2012, p. 290). Ugandan society was adapting through trial and error; the deregulation of the government that followed under the neoliberal philosophy meant the malpractices that occurred on a widespread basis were difficult to manage (Wiegratz, 2010, p. 128), which worsened the image of neoliberalism as being an improvement for Ugandan society. Additionally, a popular conception in Uganda is that homosexuality – other than a sexual orientation – is a "choice of lifestyle" that people pursue for "economic incentives" originating from the neoliberal market system (Sadgrove et al., 2012, p. 123). This condemns homosexuals as actors following 'immoral' paths solely for economic motives, but also includes the allegation that people in fragile positions – such as children, students, and choir boys – are easily persuaded into homosexual practices "with inducements including money" (Healy & Kanya, 2014, p. 153). Blame for this is attributed to the "flow of funding from donor states", as stated by *Monitor*, a prominent Ugandan newspaper (as cited in Sadgrove et al., 2012, p. 115).

As the promised benefits of neoliberal reforms failed to materialize and many Ugandans came to regard them as being set up "to exploit them with more ease" (Wiegratz, 2010, p. 130), embracing measures of modernization was seen as "leading







to moral degeneration" (Vorhölter, 2012, p. 290). The neoliberal cultural values of individualism and materialism strictly oppose traditional Ugandan values of cooperation and a fair attribution and distribution of prosperity. According to Haidt and Joseph (2007), the heightened anxiety and appointment of a scapegoat, are apparent features of the 'editing process' of national traditional morals that Uganda faces under developments of modernization (as cited in Wiegatz, 2010, p. 133). The Ugandan President of the time, Yoweri Museveni, is claimed to have associated homosexuality with many social ills, such as "child molestations, ritual child murder, corruption, opposition parties and pornography" (Kaoma, 2009, p. 15). Furthermore, Ugandan pastors adopt the same rhetoric inspired by the foreign religious right, the most controversial example being Pastor Martin Ssempe of Mekerere Community Church, whose lecture on homosexual sex went viral under the name 'Men Who Eat-Da-Poo-Poo' (Sadgrove et al., 2012, p. 113). Promoting abhorrence of homosexuality through an unrepresentative image of homosexual identity further helps to estrange Ugandan people from what they are meant to perceive as the ultimate threat. Through the appointment of homosexuality as the responsible factor in this gamut of Ugandan issues, the Ugandan governmental and religious rhetoric strongly approaches that of Western conservative evangelicals in their quest for the maintenance of tradition, and 'family values.'

The individualism promoted under neoliberal reform leads to a confrontation with Ugandan cultural notions of family values, in which the historical function of marriage is "to ensure economic and social survival, especially through the offspring" (Healy & Kanya, 2014, p. 156). Homosexuality, as a 'chosen lifestyle for individual economic benefit' is perceived as individualism *par excellence*, and thereby poses a direct threat to the Ugandan traditional family and kinship structure. In fact, the Anti-Homosexuality Bill explicitly states "the protection of the traditional family" is one of its primary objectives (Healy & Kanya, 2014, p. 152). Since homosexual roles are not a part of the traditional Ugandan kinship structures, these are not incorporated in kinship exchange systems either; this kind of economic independence challenges the foundation of morals of material exchange and offspring inheritance (Sadgrove et al., 2012, p. 119).

With the importance of offspring in the warranty of future life sustenance, the threat of homosexual 'recruitment' can seem more profound than a neoliberal market system, in that it would lead to the inevitable disruption of sexual and social reproduction (Cheney, 2012, p. 88).

In short, Vorhölter (2012) captures the idea above by noting that "references to neo-colonialism in debates about Westernization are rare, except in the issue of homosexuality. [...] In a fundamental way, homosexuality reflects anxieties about family and kinship models, moral integrity, and, generally, the African identity negotiation under Westernization" (p. 301-302). As a result, a sexual orientation is rejected based on its Christian history as a sinful practice the history which has shaped homophobia in Uganda since colonial occupation. It continues to be rejected in its contemporary context due to the fact that the homosexual identity, as presented in the 'expert views' of foreign conservative evangelicals, and as perceived by Ugandans themselves, functions as a scapegoat for a multitude of negative consequences that Western development aid has brought upon Uganda's economy, morals, and social structures in its post-colonial development.

As Anderson (2011) critically notes, "to blame coalition of Northern or Western 'conservatives' manipulating their Southern colleagues is to deny agency to those in the South who may have their own political, socioeconomic and value agendas" (p. 1602). The Anti-Western discourse expressed through the Anti-Homosexuality Bill has been viewed as part of a larger discourse of President Museveni's regime, which uses it as a "populist argument for his own autonomy" (Vorhölter, 2012, p. 303). The scapegoating of homosexuals for a wide array of social issues (as mentioned above), as well as the nourishing of a general fear of change by the widespread appeal to Ugandan 'tradition' (Healy & Kanya, 2014, p. 153), shows that the analogous argument of homophobia, on many accounts, works in favor of Museveni's efforts for the autonomy of his administration. Although the Museveni regime has, on many successful accounts, accepted its status as a "fragile state", and, ironically, even as a "frontline state" in the Western battle against religious fundamentalism in order to receive economic development aid (Fisher, 2014, p. 322), it has similarly presented itself as autonomous "architect of a rebuilt,



post-conflict Ugandan state” (p323) so as to emphasize its autonomy from Western input, and its desire for independent decision-making on the governmental level. The Ugandan government must therefore not be viewed as a passive marionette under the play of Western governmental and religious forces, but rather as a third party that may be shaped by external influences in its agency, but still operates with an agenda of its own.

In addition, perceptions of homosexuality in Ugandan citizens may reflect affectivity of the above-mentioned strategies, but this does not mean they should be considered victims of a ‘magic bullet’ in the full sense of the term. Rather, their traditions shape the way they act and think, and governmental and religious framing of the issues involved guides their opinions and arguments. Nevertheless, Uganda still knows many citizens, including but not limited to Ugandan homosexual people, that embrace gay rights. Although their voices will have less of a platform under the pressures of the government on the public sphere, they remain visible on the margins of the Ugandan society’s pursuit of a revised identity. In a sense, with the vast array of international attention paid to their marginalized situation within Uganda’s borders, they may eventually find their voices’ reach augmented abroad. Therefore, it is very important that the discourse on the subject remains open, as the current oppositional rhetoric does not acknowledge their existence in any form, which, arguably, not only has problematic consequences for their fundamental rights, but also poses a challenge in dealing with the prevailing issue of HIV/AIDS prevention in Uganda (Cheney, 2012, p. 85-86).

The international human rights movement is a prominent opposition to the development of anti-homosexual legislation in Uganda, accusing the country of violating the *United Declaration of Human Rights*. Nevertheless, Mutua (2001) states that counter-allegations have been made against the UDHR as being used for cultural imperialism and “the transformation of non-Western cultures into a Eurocentric prototype” (as cited in Sadgrove, 2012, p. 107) have been made.

Although the extent to which the cultural development agenda is correct remains open to

debate, many donors do display remnants of the patronizing colonial rhetoric in justifying their intervention in ‘fragile states’. One noteworthy example is the inclusion of anti-corruption measures in the conditionality clauses of their aid contracts, to the extent of “donors taking over the job of the state when it proves too weak to regulate change and development itself” (World Bank, 1997; as cited in Szeftel, 1998, p. 235). This rests upon the assumption that corruption is “foreign to western political practice”, but is “in the nature of African politics” and somehow outside the corrective ability of African administrations (p. 235). In Uganda, democratization and neoliberalism were introduced as means to counter the corrupting forces of economic prosperity, but as seen earlier, removing state power through deregulation did not improve the level of malpractice. The reliance on such assumptions in the rationalization of development aid echoes with colonial justifications, and reveals a prevailing “hierarchy of cultures” between Core and Peripheral states (Mutua, 2004; as cited in Healy & Kanya, 2014, p. 162) that does not always result in improving the culture subject to it, as can be seen in the case of Uganda.

In conclusion, the Anti-Homosexuality Bill represents a fundamental rejection of homosexuality in contemporary Uganda, but can also be viewed as analogous to a larger issue concerning changes in the economic system, moral framework, and fundamental identity of Uganda. These changes followed the presence of development aid agencies that have been promoting neo-liberalism since the post-colonial era, and the accompanying accusation of Western neo-colonialism. Additionally, it is possibly framed in public discourse in order to be employed as a populist argument to increase support for the autonomy of President Museveni’s regime. In its contents, the discourse appeals to Ugandan tradition, which is shaped by the presence of Western conservative evangelicals who wish to contest the liberalization of the Western world, and seek allies in the African ‘heart of conservative Christianity’. Nonetheless, with all these hidden agendas revealed, the criticism of Western agents imposing their norms on non-Western countries in the name of human rights ought to still be handled earnestly.



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