

MERICI

— URSULA HALL —
ACADEMIC JOURNAL

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Volume 2, 2016



Australian
National
University

eVIEW



Published by ANU eView
The Australian National University
Acton ACT 2601, Australia
Email: enquiries.eview@anu.edu.au
This title is also available online at press.anu.edu.au

ISSN 2206-0855 (print)
ISSN 2206-0863 (online)

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Cover design and layout by ANU Press.

Front cover photograph by Vincent Guth, unsplash.com/@vingtcent.

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A word from the editor

It is fitting that I should be the editor of the *Merici, Ursula Hall Academic Journal*, in my last year as an undergraduate. In truth, I have only the first six months of 2017 to bask in the glory of not being officially qualified before I go into the world and stumble my way through the fog of adulthood.

In this introduction, I wanted to reflect briefly on my time here, in an attempt to place this journal in some kind of context. Please indulge me this small narcissism.

When I came to Canberra from Melbourne, I thought I was escaping a bubble. I could count on one hand the amount of people who left Melbourne after high school, and it seemed to me that, fine city that it is, a world exists outside of the CBD tram network.

I realise now that I exchanged one bubble for another: the latte-sipping hipster barbers in Degrares Street for the disgruntled civil servants chomping on avo toast in New Acton. Even when we find ourselves in bubbles, we have the choice to look outside them.

This is a roundabout way of saying that *Merici* shows something outside of the bubbles where we live. Some of us, indeed, may spend our lives in Canberra, or Sydney, or Melbourne. But our university studies will always leave us with a curiosity for what lies beyond our immediate surroundings.

In this volume, I have attempted to collect a series of pieces that show the diversity of experience here at Ursula Hall. These papers have earned my deep admiration for both performing very well and also demonstrating a passion for the discipline in question.

Ultimately, the celebration of learning is something that is, surprisingly, uncommon at university. When people list their accomplishments, they start first with their advocacy, their stupol positions, their sports teams. These are all admirable, and I hope *Merici* can complement such experiences.

Merici gives students an opportunity to show their peers *why* they are here. What it is about their studies that makes them stay up all night writing that essay. Why they recede into a trance-like fugue state when exam period comes around.

Due to time and space constraints, exacerbated by exam period, I was unable to put every essay that I received into this volume, though I did have the pleasure of reading them all.

Thanks

All that is left is to express my deep gratitude to all those who made *Merici* possible this year. To those who submitted pieces, thank you for sharing your fine work. To those who helped me with the copyediting process, thanks for devoting yourselves during the busy exam period.

Thanks to those who refereed the work at short notice. Thanks to Henry, last year's editor, for providing me with all his information and, of course, for having the idea to start *Merici* in the first place!

Matthew Rogers
2016 Merici Editor

Author profiles

Jenny Calahan

Jenny is a third-year undergraduate student at the University of Arizona in the USA. She is studying astronomy, physics and mathematics and hopes to go to graduate school to become a professional astronomer. She spent a semester abroad at Ursula Hall and the support and love from the community made this research paper possible.

Guy Exton

Guy is in his second year of a Bachelor of Arts/Master of International Affairs vertical double degree at ANU. Majoring in political science with minors in history and economics, Guy's area of study is broad, encompassing many issues in current international politics. Guy is a columnist for the university newspaper, commenting on current issues and events, focusing on Britain in a 'post-Brexit' world.

Lucinda Fretwell

Lucinda is a second-year Arts and European Studies student. She has always loved history, and thinks it is very important for understanding the world today. She is particularly interested in the idea of memory, and how nations come to terms with difficult parts of their histories and incorporate it into their national stories. In 2017, she is completing a semester abroad at Sciences Po in Reims, where she hopes to gain insights into French and European perspectives on their history.

Stephanie Gajewski

Stephanie is a second-year Bachelor of Arts and European Studies student. In 2017, she hopes to complete her compulsory European Studies exchange. She wishes to pursue postgraduate studies, preferably covering content unrelated to Big History.

Jonah Hansen

Jonah is a first-year science student undertaking the Bachelor of Philosophy (Science), majoring in astronomy and astrophysics.

Lucinda Janson

Lucinda is a third-year student studying a Bachelor of Philosophy (Arts) degree, and a Diploma of Languages (Latin). She is majoring in English and History and is interested in the intersection between the two disciplines. She hopes to pursue postgraduate research in this area.

Meaghan Powell

Meaghan is a third-year commerce (international business)/law student and resident of Ursula Hall for three years. While a resident, she served as secretary of the URC, senior resident on C2 and a coach of Inward Bound.

Lalit Prasad

Lalit is a second-year student from Sydney studying computer science. He's working his way through university by teaching school children how to play chess.

Lawrence Rogers

Lawrence is an undergraduate research student at ANU, completing a Bachelor of Philosophy (Arts) in International Relations. His interests include peace and security studies, and regional institutions. Additionally, he is passionate about research and policy, and volunteers for the ANU Students' Association in a policy analysis working group.

Laksshini Sundaramoorthy

Laksshini is a second-year Arts Law student. After completing her undergraduate studies, she hopes to secure a place in the Judges Associateship Program. In the future, she wants to work in the education sector, implementing policy that will improve the public schooling system.

Brexit and game theory: A single-case analysis

Guy Exton

Abstract

The following essay was written in response to the task of researching one political issue, using one theory and one method. The issue chosen is Brexit negotiations, the method is single-case analysis and the theory is game theory. The essays thesis is that Britain will achieve less of its objectives during the negotiations given that Britain has more to lose and less leverage than Brussels. The essay goes on to predict that Britain will be forced to accept the condition of the free movement of peoples in exchange for remaining within the EU single market. This predication is supported through the creation of a pay-off matrix, which objectively seeks to measure the pros and cons of Britain's and Brussels' decisions regarding freedom of movement and free trade, *ceteris paribus*. Ultimately, given both actors are to be considered utility maximising agents, one can assume that Britain will receive a worse deal than Brussels following Brexit.

Introduction

This essay will argue that Britain will receive a worse deal than Brussels in negotiating 'Brexit'. This conclusion will be reached after considering the case of Brexit through the method of single-case analysis and by utilising game theory. Whilst it is predicted both Britain and Brussels will be worse

off from Britain's departure, Britain has less leverage and, ultimately, more to lose than Brussels, leading to the prediction that Britain will achieve less of its objectives during negotiations. There are obviously many issues to be agreed upon between the two parties, however, this essay will only consider the two most consequential: freedom of movement and free trade, *ceteris paribus*. After analysing the pay-off to each party in adopting or not adopting either of these conditions, it is concluded that Britain will be forced into a less desirable position by Brussels, and receive a worse deal.

Britain and Brussels have different objectives in negotiating Brexit. It is generally considered that Britain does not want freedom of movement and does want free trade. Britain's decision to leave the European Union (EU) was as much based on factual arguments as idealised visions of independence. Historically, this is typical of secessionist movements as a whole, that 'the right to secede flows naturally from principles of self-government such as those embodied in the American Declaration of Independence and the French Declaration of the Rights of Man and of the Citizen. This distinguished lineage affords secessionist claims an undeserved opportunity to stake out the moral high ground'.¹ The leave campaign prevailed not so much based on rational arguments, but on vague arguments of sovereignty, embodied in their slogan 'Take back control'. It is in Britain's best interests to remain within the EU single market. In the worst case, United Kingdom (UK) exports would face the EU external tariff, along with being excluded from the EU–United States free trade deal known as the Transatlantic Trade and Investment Partnership (TTIP). Further, the UK 'would lose our preferential access to 53 markets outside the EU with which the EU has Free Trade Agreements. This would take years to renegotiate, with no guarantee that the UK would obtain terms as good as those we enjoy today'.² In contrast, the UK generally does not want to remain within the EU freedom of movement policy. Many Britons' decision to vote 'leave' was in protest against the 'open borders' of the EU.³ As put by Matthew Goodwin of the University of Kent, 'The referendum is as much about immigration as it is about Britain's relationship with

1 Lea Brilmayer. 1991. 'Secession and self-determination: A territorial interpretation.' *Yale J. Int'l L.* 16: 177.

2 UK Government. 2016. *Alternatives to membership: possible models for the United Kingdom outside the European Union*. (March). London, UK: Williams Lea Group.

3 Nigel Farage. 2016. 'Why You Should Vote For Brexit This Thursday'. *Independent*, 20 June.

Europe’.⁴ Britain largely feels exploited by the EU’s freedom of movement condition, considering that roughly 1.2 million British citizens live in Europe and 3.1 million Europeans live in Britain under the freedom of movement agreement.⁵ Thus, Britain’s objectives in negotiating Brexit are to achieve free trade and no freedom of movement.

Brussels, on the other hand, wants Britain to keep freedom of movement and generally wants to keep the status quo of free trade. As put by European Commission President Jean Claude Juncker: ‘There is a clear link between access to the single market and the basic principles of the internal market, especially the free movement of workers’.⁶ That ‘[t]he EU has made clear that full access to the Single Market can only come with the acceptance of the free movement of people’.⁷ The free movement of workers is proclaimed in Article 45 of the Treaty on the Functioning of the European Union.⁸ Under this treaty, European citizens have the right to work in another EU country without needing a work permit, reside there, stay there after employment has finished, enjoy equal treatment with nationals in access to working conditions and all other social and tax advantages. These two principles – freedom of movement and free trade – are mutually inclusive. For example, countries in the European Economic Area (EEA) such as Norway make large payments to the EU, observe all regulations without having a say in their creation and, critically, accept free movement of labour to gain access to Europe’s single market.⁹ Thus, it would appear Britain will not achieve its objectives given historical precedent. This intuition is finalised through the application of game theory.

4 M. Goodwin and C. Milazzo. 2015. *Ukip: Inside the Campaign to Redraw British Politics*. Oxford: Oxford University Press.

5 Sergio Carrera. 2005. ‘What does free movement mean in theory and practice in an enlarged EU?’ *European Law Journal* 11(6): 699–721.

6 Financial Times. 2016. ‘Donald Tusk Says UK Set To Begin Brexit Early In 2017.’ *Financial Times*, 17 September.

7 UK Government, *Alternatives to membership: possible models for the United Kingdom outside the European Union*.

8 Treaty on the Functioning of the European Union (2007).

9 UK Government, *Alternatives to membership: possible models for the United Kingdom outside the European Union*.

Creating the pay-off matrix

Once one defines the objectives of Britain and Brussels, it is possible to assign values to their success or failure. For Brussels, one can assign 1 utl (utility) for achieving free trade and another for freedom of movement respectively, and negative 1 utl for no free trade and no freedom of movement. For Britain, one can assign 1 utl for achieving free trade and no freedom of movement, and negative 1 utl for achieving no free trade and freedom of movement. This simple artificial value system results in the following pay-off matrix:

Matrix 1		Brussels	
		No Free Trade	Free Trade
Britain	No Freedom of movement	-2,0	0,2
	Freedom of movement	0,-2	2,0

In this pay-off matrix, the dominant strategy for Britain is to pursue no freedom of movement, as it has the potential to result in the highest potential pay-offs of 0 or 2 utls, compared to the alternative of negative 2 or 0. Brussels has the dominant strategy of pursuing free trade as it results in the higher pay-off of 0 or 2 utls compared to negative 2 or 0. When one applies an even value system of 1 utl to each successful outcome as above, Brexit negotiations resemble the ‘chicken game’.

It is noted of the chicken game that ‘if both parties in marital conflict choose escalation to full conflict in order to get their way (mutual defection) [no freedom of movement/no free trade], this may be very harmful to both, so trying to reach a compromise (mutual cooperation) [freedom of movement/free trade] is usually preferable over mutual defection’.¹⁰ Under ‘the chicken game’ approach, Britain would pursue the strategy of no freedom of movement in the hope that Brussels will ‘swerve’ and offer free trade, whilst Brussels pursues the strategy of no free trade in the hope that Britain will ‘swerve’ and accept freedom of movement in return for free trade. This game is particularly applicable as a strict time frame has been set to complete negotiations.

¹⁰ Peter De Heus, Nick Hoogervorst and Eric Van Dijk. 2010. ‘Framing prisoners and chickens: Valence effects in the prisoner’s dilemma and the chicken game.’ *Journal of Experimental Social Psychology* 46(5): 736742.

Under article 50, Britain has two years to negotiate a deal. Two years, however, is considered not nearly enough time to complete negotiations, that '[i]t would take up to a decade or more to negotiate a new agreement with the EU and to replace our existing trade deals with other countries' means that the chicken game of Brexit negotiations would likely end in disaster.¹¹ This would most likely lead to a stalemate whereby Britain refuses freedom of movement and Brussels refuses free trade. That, 'if we [the UK] could not reach agreement with the EU on a new arrangement, our trading arrangements would revert to WTO rules. This would provide the most complete break with the EU. It does not entail accepting free movement, budgetary contributions or implementing EU rules. But it would cause a major economic shock to the UK'.¹² In terms of the model, it would result in negative 2 utls for Brussels and 0 utls for Britain.

In the scenario of an even pay-off for each achieved objective as illustrated, neither party has an advantage in negotiations, as there is an incentive to hold off forfeiting either freedom of movement or free trade before the other party. Thus, if this were reality, it is unlikely that either country would gain an optimal outcome in negotiations.

Complicating the pay-off matrix

To represent Britain's real power, we must reassign the number of utls to the success or failure to different outcomes. For Britain, a more accurate picture would be to assign negative 5 utls to no free trade, given how it would cripple the UK's economy and given that HM Treasury predicted that British gross domestic profit (GDP) would grow by 7 per cent less than if Britain remained in the EU.¹³ Two utls will be awarded to Britain for gaining free trade as it is comparatively not much of a success given it already occurs: 'The UK Government believes that no existing model outside the EU comes close to providing the same balance of advantages and influence that we get from the UK's current status inside the EU'.¹⁴ In terms of freedom of movement,

11 UK Government, *Alternatives to membership: possible models for the United Kingdom outside the European Union*.

12 Ibid.

13 UK Government. 2016. *HM Treasury analysis: the immediate economic impact of leaving the EU*. (May). London, UK: Williams Lea Group.

14 UK Government, *Alternatives to membership: possible models for the United Kingdom outside the European Union*.

whilst it is a policy that has met with passionate disapproval by the British public, it is less consequential that free trade. Thus, 1 utl will be given to Britain for no freedom of movement and negative 1 utl will be awarded for freedom of movement.

Vice versa, Brussels has significantly more leverage over Britain in negotiations than depicted in Matrix 1. Two utls will be awarded for achieving free trade and freedom of movement respectively, with negative 1 utl being awarded for either of these not being employed. This allocation of negative 1 utl is justified on the grounds that ‘if Britain got such a deal, it would have to be offered to other EEA countries’ and losing Britain from the single market would not benefit Brussels.¹⁵ The revised pay-off matrix looks as follows:

Matrix 2		Brussels	
		No Free Trade	Free Trade
Britain	No Freedom of movement	-2,-4	1,3
	Freedom of movement	1,-6	4,1

The updated matrix illustrates the significant advantage Brussels holds over Britain in negotiations. Ultimately, as Brussels holds the ability to grant or not grant free trade, and considering Britain’s reliance on it, Brussels is able to manipulate Britain.

Playing the game

A key aspect of negotiations is freedom of information. That is, ‘in a two-person game of perfect information, the players move one at a time, and when choosing a move each player knows the move(s) that have preceded it’.¹⁶ As each party can openly make threats before the deal is struck, the more powerful party would be able to coerce the weaker party. In practice, this would see Brussels threaten Britain with no free trade unless freedom of movement is guaranteed. If Brussels’ threat was not called and Britain accepted no free trade for no freedom of movement, the pay-off of negative 2 utls (Brussels),

15 The Economist. 2016. ‘Article 50 Ways To Leave Your Lover’. *The Economist*, 2 July.

16 Andrew M. Colman. 2013. *Game theory and its applications: In the social and biological sciences*. Boston: Psychology Press.

negative 4 utls (Britain) would be achieved. Whilst this is a possibility, we can assume that each party is a utility maximising, rational agent. That players 'are assumed to think carefully about their choices and the possible choices of other players'.¹⁷ As such, Britain would prefer 1 utl to negative 4, as 1 utl is gained from achieving freedom of movement and free trade whilst negative 4 is gained from no free trade and freedom of movement. Thus, as negotiations unfold, it can be assumed that Britain and Brussels will keep the status quo of free trade and freedom of movement, *ceteris paribus*.

Conclusion

This essay has argued that Britain will achieve less of its objectives than Brussels during Brexit negotiations. This essay has only considered the two most pressing issues regarding Brexit, that of freedom of movement and free trade. By assigning values to each condition for each party, it is possible to create a pay-off depicting each outcome. Thus, through game theory, this essay has attempted to prove that Britain will receive a worse deal than Brussels. This conclusion is affirmed in a report presented to parliament, that 'in return for full access to the EU's free-trade Single Market in key UK industries, we would have to accept the free movement of people'.¹⁸

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18 UK Government, *Alternatives to membership: possible models for the United Kingdom outside the European Union*.

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Inverse P Cygni profiles and their use in astronomical observations

Jenny Calahan

Abstract

The motivation behind this research project is to better understand protostellar objects and their links to early stellar formation. Specifically, we would like to develop software that will take in an inverse P Cygni line profile of a molecular cloud undergoing infall motion, and give us back the infall rate that is required for that line profile. To do so, we will be editing and using DESPOTIC to take an inverse P Cygni line profile and reverse engineer it in order to get back infall rates such as the infalling velocity, the density, and temperature profiles of the cloud.

Introduction

In this project, we use what we call line profiles. Line profiles show the intensity of the radiation from a particular transition of a certain molecule as a function of the velocity along the line of sight. A line profile can contain information throughout the cloud because of the Doppler effect. A certain wavelength corresponds to a certain velocity, so we have the ability to see motion of a cloud from front to back. An example of the line of sight and cloud motion is seen in the top part of Figure 1. The dashed line is the line of sight. The specific line profile we use to explore these objects is the inverse P Cygni line profile.

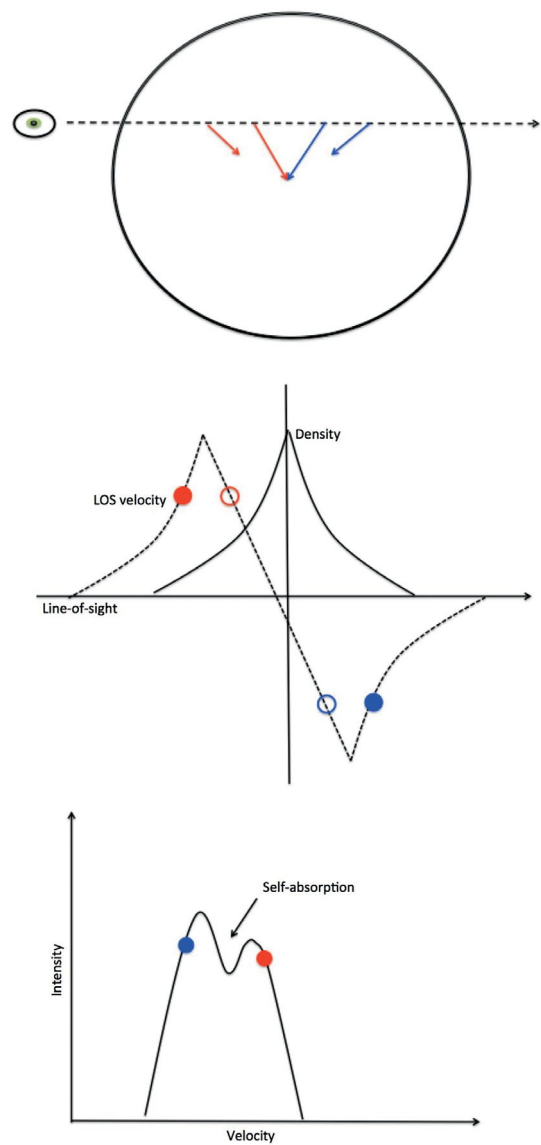


Figure 1: How a line profile describes a molecular cloud.
Source: After Smith et al. 2012.

P Cygni is a luminous blue star that had a unique line profile. While most stars like P Cygni have a line profile that show emission lines (from elements such as hydrogen, helium, and beyond) P Cygni showed absorption lines in the bluer wavelengths and emission lines in redder wavelengths. It became apparent that these now named ‘P Cygni’ profiles come about when we are observing an object that has a very hot centre, which is surrounded by an outflowing material.¹

We will be looking at what we call ‘inverse P Cygni profiles’, which are the exact opposite of what P Cygni profiles are. The objects we are looking at are collapsing in on themselves, what we call infall motion. A cartoon of how we get a P Cygni profile is shown in Figure 1. As we can see in that figure, we have a core that is collapsing. There is both blueshifted light (material falling towards us) and redshifted light (material falling away from us) represented in the line profile. But, the blueshifted light is more intense than the redshifted light. This isn’t because there is more material falling away from us than towards us, but instead it is an effect due to a simple thermodynamic principle.

There are two types of temperatures in play when we talk about radiative transfer, which is the driving force behind these line profiles, and we need to keep both in mind when creating line profiles. There is the kinetic temperature, which is related to the kinetic energy of a molecule and is what we are most familiar with in day-to-day life. Then there is excitation temperature, which is the temperature difference between a molecule in a lower quantum state to an upper quantum state. These temperatures can often be assumed to be equal and, when they are, we call this state local thermodynamic equilibrium, or LTE. If we assume a molecular cloud is in LTE, we can derive the radiative transfer equation using the number density of molecules in the cloud and the kinetic temperature. The radiative transfer equation is the basis behind calculating a line profile, and is described in the next section.

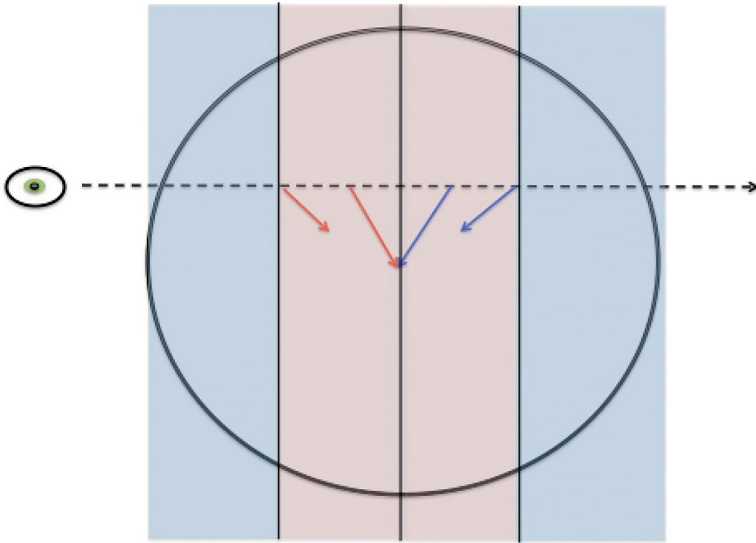


Figure 2: The first part of Figure 1, with added color to describe the kinetic temperature within the cloud. The blue represents hot while the red represents cold. The eye on the left is the observer.

Source: After Smith et al. 2012.

To get an inverse P Cygni line profile, we need the temperature in the centre of the cloud to be warmer than the outside of the cloud. In the simplest model of a molecular cloud, we imagine it to be four separate sheets of cloud. This is illustrated in Figure 2. On the redshifted side, there is a cool sheet in front of a hot sheet and continuing through the cloud there is a hot sheet in front of a cool sheet, which is the material that is blueshifted. This is where some thermodynamics comes into play. When we look at the redshifted side, we see cool in front of hot. We also know that when we have a cool gas in front of a hot gas, the cool gas will absorb a lot of the energy from the hot gas. The reverse comes into play on the blueshifted side. There is a hot sheet in front of a cool sheet, so there is not as much absorption as there is on the redshifted side. This is what causes the cloud's line profile to have more intensity on the blueshifted side of the velocity spectra. This is the inverse P Cygni profile, and is also called blue asymmetry.

However, the kinetic temperature of a molecular cloud can be considered constant, or even cooler in the centre of a molecular cloud. This is because there is no internal heat source within the cloud at the beginning of infall. Only once there is a high enough density in the centre to begin adiabatic heating can we assume that the centre has a higher kinetic temperature than the outside of the cloud. But for a very young protostellar object, we assume that the main source of heat is from background starlight, so the cloud is heated on the outside, but not so much the inside, and the temperature throughout is on the order of 10K. So, in order to get this inverse P Cygni profile, it is the excitation temperature that makes the difference. In these molecular clouds, we can assume that there is LTE near the centre of the cloud, but not on the outside, so there is a higher excitation temperature in the centre than there is on the outside. It is this excitation temperature that governs the temperature difference that allows us to see an inverse P Cygni profile.

In order to see this line profile, astronomers need to probe the cloud using a certain molecular tracer. The way that we look at a molecular cloud with a radio telescope is we tune the telescope to a certain frequency that corresponds to a transition from a certain excited state of a molecule to a lower energy state. In choosing the molecule to use, we need to be careful. We need a molecule that is relatively abundant, that can be excited at cold temperatures, and has a strong transition, and is somewhere in-between optically thin and optically thick. Optically thick means that a photon emitted in the cloud has much less than a 50 per cent chance of escaping the cloud, but rather will be reabsorbed by the cloud. Optically thin is the exact opposite; a photon emitted has a very high chance of escaping the cloud. A molecule that is completely optically thin would not produce an inverse P Cygni profile, it would be difficult to detect much from the cloud at all. If a cloud is too optically thick, then we do not get the asymmetry that is characteristic in an inverse P Cygni profile.

One might think that molecular hydrogen would be a great molecule to use, because it is by far the most abundant molecule in the universe, and it is sure to be quite abundant in a molecular cloud. But the problem with hydrogen is that at the temperatures that these clouds are at, there are no observed excitations of the molecule at this temperature. Other abundant molecules have different problems. It is possible for them to be too abundant in the cloud, to a point where the cloud becomes optically thick. We need a molecule that not only has active transitions at temperatures around 10K, but also is abundant to a point where it is between being optically thick and

optically thin. There are a few special molecules out there that work well. HCN, CS, N_2H^+ , and HCO^+ are all examples of molecules that still have active transitions at these temperatures, they are all relatively abundant, as well as being marginally optically thick. They all have the ability of creating an inverse P Cygni profile with varying precision.

Looking out for these inverse P Cygni profiles primarily allows us to find and identify molecular clouds that are undergoing infall motion. This is the earliest stage in star formation, and is not fully understood.

DESPOTIC and inverse P Cygni profiles

We are just starting to understand and create surveys of these prestellar objects. Thanks to the Bolocam Galactic Plane Survey (BGPS), we have discovered over 2,200 massive starless ‘clump’ candidates.¹ ‘Starless clump’, being a massive molecular cloud with no stellar activity, meaning there is no internal heat source within the cloud. From this survey, within the 2,200 line profiles, astronomers are searching for infall candidates with inverse P Cygni line profiles (see Figure 3). Once we find these inverse P Cygni profiles we want DESPOTIC, which is software to Derive the Energetics and SPectra of Optically Thick Interstellar Clouds to give us the required infall rates for these line profiles.

¹ Brian E. Svoboda et al. 2016. ‘The Bolocam Galactic Plane Survey. XIV. Physical Properties of Massive Starless and Star-forming Clumps’, *The Astrophysical Journal* 822(2).

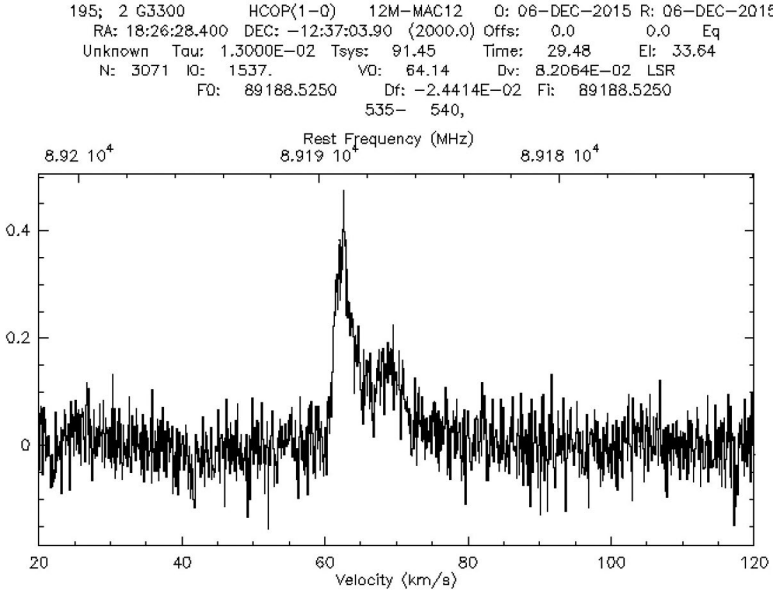


Figure 3. Invers P Cygni line profiles of two infall candidates from the BGPS survey using the chemical tracer HCO+ 1-0.

Source: Calahan et al. in prep.

In order to accomplish this, we first needed DESPOTIC to probe the cloud using a Gaussian-shaped beam, similar to a radio telescope. In its previous state, the code was set out to create a line profile of a cloud by assuming that radio telescope had an infinitesimally small pencil beam. In reality, radio telescopes have a Gaussian beam. In order to get the code to make a line profile using a Gaussian beam, all we had to do was edit the lineProfLTE.py section of code to integrate a pencil beam over a Gaussian shape, which could have a size as given by the user. We used the original lineProfLTE pencil beam and integrated over the surface of a Gaussian shape. Specifically, we used the following equation to determine the intensity across the cloud:

Equation 1

$$I_{avg} = \int I(v, x') G(|x - x'|) dA$$

Where $I(v, x')$ was the intensity at velocity v and offset from the center of the cloud x' and $G(|x - x'|)$ is the Gaussian equation with a specified dispersion that is given by the user. If the user did not specify a beam size, then it would assume a pencil beam. We would then integrate I_{avg} from 0 to 1, being from the centre of the cloud to the radius. We would end up with an array of I_{avg} values that corresponded to a v value. This is what became the line profile of the cloud. Using a Gaussian beam in the modelling process makes a big difference in the line profiles. Not only does the shape change from pencil to Gaussian, but also the peak intensity will change, which follows what we see in observations and in the theory. This was a subtle change in the lineProfile code, and a simple change to make, but can make a world of difference when modelling molecular cloud line profiles.

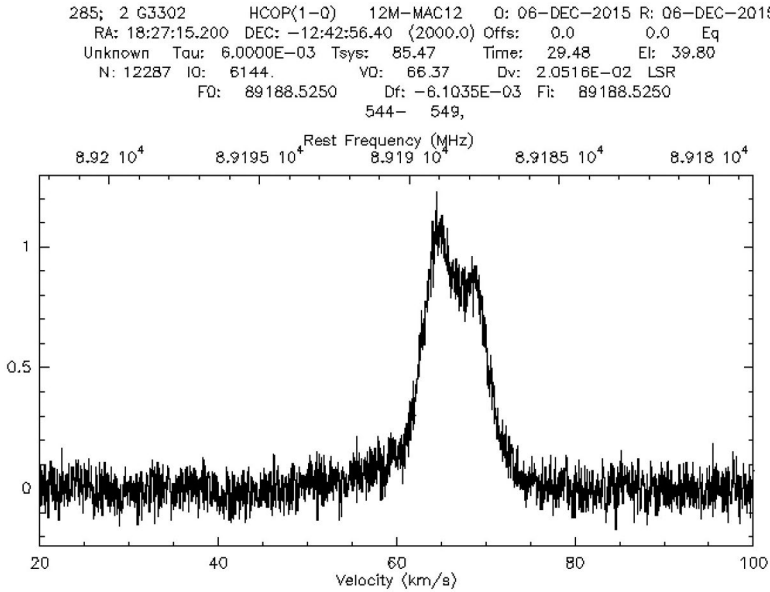


Figure 4: Two line profiles of a molecular cloud with constant parameters except for the beam size.

Source: Calahan et al. in prep.

Now that we have a more realistic beam for our modelling, we need to run DESPOTIC with certain density, velocity, and temperature profiles as described in Krumholz et al. 2016 and as seen in Equations 2–4. If given the number density of the molecular tracer, the initial temperature T_0 , initial density of the cloud ρ_0 , the radius of the cloud R , and the mass infall rate \dot{M} , we have enough information to calculate the line profile of a cloud.

Equation 2

$$T(r) = T_0 \left(\frac{r}{R} \right)^{-0.3}$$

Equation 3

$$\rho(r) = \rho_0 \left(\frac{r}{R} \right)^{-\frac{3}{2}}$$

Equation 4

$$v(r) = \frac{\dot{M}}{4\pi R^2 \rho_0} \left(\frac{r}{R} \right)^{-\frac{1}{2}}$$

These conditions of density, temperature, and velocity are derived in Krumholz et al. (2016) and describe material free-falling onto a point mass with a constant mass flux. From these conditions, LineProfLTE numerically integrates the transfer equation, which is derived in Krumholz (2013) as the following:

$$\frac{d\mathcal{I}_f}{dx} = n_i \frac{g_u e^{-\Theta_\ell/t}}{4\pi Z_s(T)} [e^{-\Theta/t} - \tau_0 (1 - e^{-\Theta/t}) \mathcal{I}_f] \phi_f, \quad (\text{C8})$$

where

$$\phi_f = \frac{1}{\sqrt{2\pi\sigma_f^2}} \exp \left[-\frac{(f - f_0)^2}{2\sigma_f^2} \right] \quad (\text{C9})$$

$$f_0 = 1 - \beta u \sin \frac{x}{\sqrt{x^2 + (d/R)^2}} \quad (\text{C10})$$

$$\sigma_f = \sqrt{\beta_s^2 t + \beta_\sigma^2 \psi^2} \quad (\text{C11})$$

and we have defined the dimensionless ratios

$$\Theta_\ell = \frac{E_\ell}{k_B T(R)} \quad \Theta = \frac{E_u - E_l}{k_B T(R)} \quad (\text{C12})$$

$$\beta = \frac{v(R)}{c} \quad \beta_s = \frac{k_B T(R)}{\mu_s m_H c} \quad (\text{C13})$$

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Figure 5. Right-hand side of the transfer equation as a function of radius on a logarithmic scale at a velocity of -10 km/s.

Source: Krumholz 2013.

Where $n'_s = n_s/n_s(R)$, $t = T/T(R)$, $\psi = \sigma_{NT}/\sigma_{NT}(R)$, $u = v/v(R)$, f is a dimensionless frequency $\frac{v}{\Delta E}$, g_u is the degeneracy of the upper states of the molecule, and $Z_s(T)$ is the partition function for species s at temperature T .

After defining the transfer equation above using the values that the user gives us, we use the `scipy` integrate function `odeint`, and integrate over a range of velocities (that either `lineProflTE` creates, or is given to us by the user). What we get out of that is an array of intensity values that we can plot verse the range of velocities in order to plot the line profile.

We made some changes to the `lineproflTE` code in attempts to make it more precise. First, we adjusted the radius limits that we gave `odeint`, originally we just gave it the outer bounds, from the back of the cloud to the front of the cloud. We then added a limit that was the radius at which the line of sight velocity was, to make sure the integrator hit that key point. We also added points around it. A visual representation of this is seen in Figure 5 where we graph the right-hand side of the transfer equation as a function of radius at a given velocity. The radius at the line of sight is the point at which the transfer equation peaks and it varies depending on the velocity you are exploring. Solely adding those limits was not enough, because in linear space, that jump in the transfer equation is like a delta function, especially when you go up to higher velocities, it is very hard for the `odeint` function to find. So, we made a new definition for the right-hand side of the transfer equation. We told `lineProflTE` to integrate over a log scale where we wrote the normalised radius in terms of a log scale. We did this because it was easy to for us to see the point in which the transfer function peaked, and so could `odeint`. We had to write a new version of the transfer equation. We wanted the following:

$$\frac{dl}{d\log(r)} = \frac{dl}{ds} * \frac{ds}{d\log(r)}$$

Where $\frac{dl}{ds}$ was from the normal transfer equation and $\frac{ds}{d\log(r)}$ depended on the location of the beam. With this change, the resulting line profile was much more realistic, and we had made `lineProflTE` more flexible for other astronomers using the program.

With this code, we will be able to create a line profile with known density, temperature, and velocity dispersion. We can then add some noise to that line profile and use a fitting program from `scipy` on that noisy line profile. Using

that fitting program and the line profile with known features, we can figure out ways to start with an observed profile and derive the density, temperature, and velocity profiles of the cloud. We will have the ability to take an infall candidate from the BGPS and use DESPOTIC to then vary the parameters until a fit is found.

Future applications

Despotic is a very exciting tool that is making huge strides in the modelling and overall understanding of protostellar objects and stellar formation. With this project in particular, we have improved the ability to model a molecular cloud undergoing infall motion. Growing on that, it would be incredibly helpful if we were able to take an observed line profile and determine the density, velocity, and temperature profile of that cloud. The second part of the project has taken the first steps in being able to do just that.

Within that large Bolocam Galactic Plane Survey of 2,200 starless candidates, we at the University of Arizona are combing through and blindly searching for infall candidates. We do this by creating a line profiles for the best starless clump candidates and when we find an object that has an inverse P Cygni profile, we call that a good candidate for infall motion, which, as discussed, is the precursor for stellar formation. After identifying and integrating over around 100 objects, we found 6 objects that were good candidates for infall. For further confirmation of infall motion, it is necessary to use bigger radio telescopes with higher resolution in order to get a more detailed view with the cloud. But, in the meantime, there is not much information we can get from that profile, just that it is a good candidate for infall and we can find ways to quantitatively express the degree of blue asymmetry. If we were able to determine such things as the density, temperature, and/or velocity profile of the cloud it would unearth extremely valuable information, which would be incredibly useful and insightful. Perhaps we can determine how good of an infall candidate it is, and then we do not have to waste time on a highly sought after research telescope. We could compare and contrast these parameters with the mass of the cloud, the distance from us, and the size of the cloud, which is information we have from BGPS. The possibilities seem endless if we could get that information just from a cloud's line profile. There is just still so much we

do not understand about stellar formation, and being able to answer a few of these questions will help us understand these objects that underlie everything from planetary to galactic evolution.

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Is the idea of human rights a universal concept?

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Abstract

While human rights is not a universal concept, its construction as a form of Western cultural imperialism represents an unfounded and inaccurate reading of civilisation. The idea of human rights as an entitlement of every human being, with an unqualified universal scope, is somewhat unattainable as variations in conceptions of justice are inevitable. However, the assertion that human rights are imposed by the West and would otherwise hold no resonance in non-Western societies, overstates the uniqueness of human rights to Western culture. Rather, there is an ‘overlapping consensus’ in that the acceptance and recognition of human rights is not complete but partial. While its principles cannot possibly be applicable to all state priorities and behaviour, the general concept of justice, at a higher level of abstraction, transcends cultural boundaries and is not solely confined to Western society. This notion is demonstrated through an examination of Islamic culture and Sharia law.

Introduction

In response to this contentious issue, two prominent schools of thought have emerged: unilateral universalism and cultural absolutism. Proponents of unilateral universalism, most notably Tharoor in ‘Are Human Rights Universal?’, concedes that human rights are derived from a shared faith in

humanity and cultural considerations become immaterial.¹ On the other end of the spectrum, cultural absolutists like Ibhawoh describe human rights as one particular culture being imposed upon the entire world in a form of neo-imperialism.² Unlike traditional approaches that consider the absence of universality and Western cultural imperialism as interchangeable and consequences of one another, this essay will investigate the nuances between these two extreme positions. By considering each proposal in isolation of one another, the inherent flaws of both arguments will become apparent. This will warrant the conceptualisation of an overlapping consensus.

A universal standard

The presumption of universal human rights, in its demanding form, is somewhat unachievable as states will inevitably vary in their perception of justice. As rights are defined by the value systems adopted by states, the absence of a homogenous moral community defeats universalist arguments. In other words, the diversity of moral systems means that states will obviously designate and place emphasis on different aspects of justice. The mere assertion of a universal standard conjures philosophical questions of ‘whether anything in our pluri-cultural, multipolar world can be truly universal?’³ According to Donnelly, theories stemming from such a ‘perverse’ and ‘arrogant’ unilateral universalism fail to consider the nature of international diversity.⁴ Therefore, the universality of human rights is largely undermined by the variety of moral systems in the international sphere.

The cause for such variations can be attributed to certain states prioritising collective needs over individual human rights. The concept of human rights is founded on inalienable, indivisible rights that are innate to all human beings. This presents a host of complexities in communal cultures, where individual rights are viewed only as duties that a person has to the group. For example, in Chinese Confucianism, individual entitlements are inherently intertwined

1 Shashi Tharoor. 1999/2000. ‘Are Human Rights Universal?’ *World Policy Journal* XVI(4) Winter.

2 B. Ibhawoh. 2007. *Imperialism and Human Rights: Colonial Discourses of Rights and Liberties in African History*. New York: SUNY Press.

3 Shashi Tharoor, ‘Are Human Rights Universal?’.

4 J. Donnelly. 2007. ‘The Relative Universality of Human Rights.’ *Human Rights Quarterly* 29(2): 305.

with communal duties: 'I am because we are, and because we are therefore I am'.⁵ Moreover, despite violating various human rights, the practice of female circumcision in African cultures is an indispensable prerequisite to marriage and an estial component of a woman's traditional role within her community.⁶ Thus, the individualistic themes embedded in human rights often conflict with the communitarian ethic that characterises traditional societies.

Western cultural imperialism

Nonetheless, a lack of universality does not equate human rights to Western cultural imperialism. By portraying human rights as unique to Western states, cultural absolutists depend upon unsubstantiated claims of 'clashing civilisations'.⁷ This falsely implies that the West alone have arrived at the paradigmatic principles contained within the Universal Declaration of Human Rights (UDHR) and such ideas fall outside the trajectory of non-Western civilisations. Viewing international relations as a binary relationship between the West and the non-West incorrectly subsumes all members of society under a generalised and inaccurate framework. Sen argues that oversimplifications about 'Western civilisation', 'Asian values', 'African cultures' and so on are not only unfounded readings of history, but also add to the divisiveness of the world.⁸ Therefore, considering human rights as Western imperialism assumes a cultural dichotomy that simply does not exist.

The absence of clashing civilisations is a result of 'cross-cultural fertilisation', where human rights ideals are not localised to specific geographic regions or societies. The intellectual movements associated with the West have multiple and diverse foundations as cultures are not 'sealed boxes but a fertile jungle of different sources'.⁹ For instance, although often accredited to an outcome of Western liberalism, the language of freedom is a key tenet of Buddhism

5 J. Young Lee. 1984. *Marginality: The Key to Multicultural Theory*. Minneapolis: Fortress Press, p. 31.

6 G. Gallo, P. Hodges and M.F. Vivani. 2006. *Bodily integrity and the politics of Circumcision*. New York: Springer Publishing.

7 S.P. Huntington. 1961. *The Clash of Civilisations and the Remaking of World Order*. New York: Simon & Schuster, p. 1.

8 A. Sen. 1998. *Universal Truths: Harvard International Law Review*. Massachusetts: Harvard University Press.

9 M. Midgely. 1981. *Trying out one's new sword*. New York: Palgrave MacMillan, p. 2.

and can, by extension, be seen to originate in South-East Asia. Similarly, a plethora of contemporary Indian literature has represented the Hindu caste hierarchy as a multidimensional system of human rights.¹⁰ The enduring (not universal) relevance of human rights to non-Western states is exemplified by Donnelly, who proposes that even if a value or practice emerged in place A, it is a dubious philosophical claim to assume its complete inapplicability to place B.¹¹ As a result, human rights should not be viewed as Western imperialism because doing so would deny recognition of its multicultural sources.

Overlapping consensus

The overlapping consensus is an alternative and more moderate explanation that lies between these two extreme standpoints. The term, coined by John Rawls in his development of political liberalism, can be viewed as the ‘political and philosophical equivalent of the Venn diagram framework’.¹² It illustrates how supporters of conflicting normative doctrines can somehow agree on particular ideas or arguments. The commonality of values doesn’t imply universality but rather a coincidental overlap. Hence, the concept of overlapping consensus provides a platform for which the competing claims of universalism and cultural relativism can be reconciled.

Applying this theory to human rights reveals the obvious discrepancies, as well as the similarities, between the two opposing schools of thought. On one hand, the universal standard of human rights is unattainable as different states will inevitably adopt different moral systems. On the other hand, the interpretation of human rights as a product of Western imperialism is implausible because the idea did not originate from any exclusive Western cultural roots. The space in which these two competing conjectures converge, or the point of intersection on the Venn diagram, is the political conception of justice underpinning human rights. That is, although this conception of justice produces different meanings for different states, the recognition of a need to achieve justice is pervasive throughout the world and is not bound

10 J. Donnelly, ‘The Relative Universality of Human Rights’, p. 295.

11 Ibid.

12 G. Forster and A. Bradley. 2014. *John Rawls and Christian Social Engagement: Justice as Unfairness*. Maryland: Lexington Books, p. 20.

to a particular culture. Thus, the overlapping consensus captures the often neglected 'grey area' of human rights and moves beyond a dichotomous presentation of the issue.

Case study: Islamic culture and Sharia law

Islamic culture represents an alternative value system that is, to some extent, incompatible with human rights. For instance, the penalties available under Sharia criminal law are considered cruel and clearly contravene Article 5 of the UDHR. According to Islamic culture, these inhumane punishments, such as flogging and the amputation of limbs, are viewed as a necessary component of social order. Another point of conflict between human rights and Sharia law is that the rights of women are restricted to traditional duties owed to the family rather than being individualistic in nature. This is exemplified by Abu Huraira (a companion to the Prophet Muhammad), who stated that a woman's duties, and thereby her rights are confined to the 'care of her young ones and the protection of her husband's property'.¹³ Hence, Islamic culture diverges from human rights and simultaneously disproves the presumption of universalism.

However, while Sharia law does divert from human rights, Islamic culture has consistently promoted the idea of justice and is not entirely detached from liberalist thinking often associated with the West. Paralleling the 'right to life' enshrined in the UDHR, the Quran upholds the sanctity of human life as it is considered a divine bestowal on humanity that should be secured by all means.¹⁴ Moreover, the Islamic concept of Adl reflects themes expressed within human rights doctrines as it stipulates 'fairness in everything a person does'.¹⁵ The freedom of religion is also protected through a number of Quranic passages, which clearly state that the responsibility of Prophet Muhammad is to communicate the message of God and not to compel anyone to believe: 'those who follow the Jewish and the Christians and the Sabians ... shall (have) no fear, nor shall they grieve'.¹⁶ Furthermore, verse 24:27 of the Quran recognises privacy as a human right and outlines rules that safeguard an

13 M. Al Bukhari. 854. *Sabih al-Bukhari*, n/a, 278.

14 I. Ali. 632. *The Quran*, Mashhad, Iran.

15 H. Beilefeldt. 2000. "'Western' versus 'Islamic' Human Rights Conceptions?: A Critique of Cultural Essentialism in the Discussion on Human Rights." *Political Theory* 28(1): 117.

16 Ali 632, verse 2:62.

individual's home life from undue intrusion.¹⁷ Therefore, as evidenced from the above examples, Sharia law is not completely dislocated from human rights ideals.

By applying the concept of overlapping consensus to Sharia law, the relative acceptance of human rights in Islamic states can be explained. Sharia law diverges from human rights in that responsibilities to the community supersede the human rights innate to individuals. However, Islamic culture has also promoted values consistent with the UDHR, such as freedom, fairness and tolerance. Instead, there is an overlapping consensus: while the ideals promoted by Islamic culture do not completely align with those contained in human rights, there is a broader conception of 'divine justice' in which morality is sanctioned by the Quran and other religious traditions. As a result, the theory of overlapping consensus accounts for the incomplete but partial recognition of human rights in Islamic states.

Conclusion

After examining the key aspects of this debate and analysing the role of human rights in Islamic culture, it is evident that the idea of human rights is neither universal nor does it represent Western cultural imperialism. The assumption of universalism is undermined by certain states prioritising collective needs over individual rights. However, cross-cultural fertilisation means that human rights also fail to represent Western cultural imperialism as the ideals are applicable to non-Western states as well. Instead, there is an overlapping consensus where the political conception of justice, whatever that conception may be, is internationally recognised.

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Review: *Maps of Time*

Stephanie Gajewski

Abstract

This is a review of *Maps of Time* by David Christian (also known as the originating book in the ‘discipline’ of Big History), and an extended discussion on how Big History has evolved, including its teaching in classes and the Bill Gates-funded Crash Course mini-series. The review interrogates the text through historiographical approaches and concepts, and challenges the text and Big History’s standing as ‘history’, which through examination I conclude cannot be considered a work of history.

Big History

Maps of Time: An Introduction to Big History by David Christian, published in 2004, provides the framework for a new field within history and raises many questions about the practice of history and challenges a variety of preconceived attitudes towards the discipline. The book requires the reader to engage in a dramatically new attitude towards history, one that is best summarised by John Green in the Crash Course mini-series *Big History* replying to a statement by himself from the past.¹ Past Green believes that the

1 Throughout John Green’s Crash Course series, he introduces a gag where John from the Past asks present John seemingly silly and ignorant questions, which John dismisses and throughout

outline set for the mini-series qualified as science, ‘not history’.² Present Green replies, ‘academics often describe history as ... all the stuff that’s happened since we started writing things down but they only start there because that’s where we have the best information ... as a start date for history, it’s totally arbitrary! It’s just a line we drew in the sand and said “okay, history begins now!”’.³ This opening establishes not only the key aims of *Maps of Time*, but problems with its proposition, which includes the concept of expansion of the time being considered as history and what are the appropriate sources for history. By examining the text, its aims and methods and its influence since its publication, other issues key to the discipline of history are raised, including whether there is a timescale too large for a historian to work on, what the role of narrative within history and historiography is and, at the most fundamental level, can *Maps of Time* be considered a work of history?

A ‘traditional’ history text would be bound by a certain scope, be it one of time, geography, event, individual or other aspect. *Maps of Time* does not have this limitation – it aims to tell the story of ‘Big History’, which, according to his 1991 article ‘The Case for Big History’, is ‘the exploration of the past on ... different scales, up to the scale of the universe itself’.⁴ Engaging in historical analysis through a ‘telescopic lens’ isn’t a concept unique to Big History.⁵ Fields including World History and Global History seek to look at history through wider geographic lens. In the same article, Christian notes World History suggests a ‘radical answer ... in geographical terms, the appropriate scale may be the whole of the world’, and his aim with Big History is to take a similarly radical answer with the notion of timescales.⁶

the content of the video, explaining how John from the Past’s opinion was wrong. CrashCourse. 2014. ‘The Big Bang: Crash Course Big History #1.’ YouTube video, 14.24, 17 September, www.youtube.com/watch?v=tq6be-CZJ3w.

2 Ibid.

3 Ibid.

4 David Christian. 1991. ‘The Case for Big History.’ *Journal of World History* 2(2): 225. Accessed 3 June 2016: www.jstor.org/stable/20078501.

5 Frank Furedi. 2013. ‘Big History: The Annihilation of Human Agency.’ Spiked, 24 July. Accessed 3 June 2016: www.spiked-online.com/newsite/article/frank_furedi_on_history/13844.

6 Christian, ‘The Case for Big History’.

In aiming to cover the entirety of the past, *Maps of Time* is divided into six parts that operate as the book's timescales. Part One, 'The Inanimate Universe', describes the time from the big bang to the 'origins and history of the Earth'.⁷ Part Two, 'Life on Earth', covers the 'origins of life' to the 'evolution of life'.⁸ Part Three, 'Early Human History', sees the introduction of humans into the narratives and covers their 'evolution' and 'beginnings'.⁹ Part Four, 'The Holocene', covers material that is traditionally seen as the start of history, with the 'origins of agriculture' and 'civilisations'.¹⁰ Part Five, 'The Modern Era', begins in 1000 CE, focusing on the evolution from 'modernity' to the 'twentieth century'.¹¹ The book concludes with Part Six, 'Perspectives on the Future', where Christian outlines different possible futures for the Earth and the universe.¹² Additionally, throughout the book, Christian refers to 'threshold' moments, which, in a 2011 TED talk, he described as moments that create new 'stages', that create 'the impression of something utterly new appearing almost out of nowhere in the universe'.¹³ *Maps of Time* outlines a number of different thresholds, including the temperature of the universe dropping, the 'appearance of humans' and the development and global spread of cities.¹⁴

Christian's justification for this radical reinterpretation of history is that 'we need to know where we are going, where we have come from, and in whose company we are travelling'.¹⁵ He further notes that 'the project ... fulfils deep needs'.¹⁶ Also, he challenges the traditional modes of history by suggesting that teaching history without the full context of the past is like a 'geographer ... teach[ing] exclusively from street maps'.¹⁷ The aim of Big History is to write a history of the whole past, effectively creating 'a map of the world' that 'embraces the past at all scales'.

7 David Christian. 2004. *Maps of Time: An Introduction to Big History*. Los Angeles: University of California Press, p. xii.

8 Ibid.

9 Ibid.

10 Ibid., pp. xii–xiii.

11 Ibid., p. xiii.

12 Ibid.

13 David Christian. 2011. 'The history of our world in 18 minutes,' TED, April. Accessed 3 June 2016: www.ted.com/talks/david_christian_big_history/transcript?language=en.

14 Christian, *Maps of Time: An Introduction to Big History*, pp. 25–26, 144, 325–326.

15 Ibid., p. 1.

16 Ibid., p. 3.

17 Ibid.

It would take a highly egotistical person to believe they could successfully write an account of the entire past, but Christian believes he is able to achieve this feat. His approach varies according to the different timescales he is writing with. The first three parts of the book, which account for approximately a third of the book's length, are more concerned with explaining scientific fact and providing a chronology of scientific breakthroughs than they are with engaging with traditional historical method. This, in part, is due to this period not containing traditional historical documents. This results in these parts reading only as a chronology of events, with explanations of scientific concepts scattered throughout this narrative.

Once Christian reaches the 'traditional' beginnings of history, evidence of historical method emerges. Archaeological and historical sources appear when discussing the 'origins of agriculture', and Christian is able to write in detail about specific examples of ideas and phenomena, such as intensification in Australia.¹⁸ With the body of traditional historical records available to him, Christian is able to engage in the historical method of reconstructing the past. This can be seen when he explores 'early agrarian lifeways' and his depiction of how these forms of communities operated.¹⁹

In these parts of the narrative that contain minimal historical records, Christian places a heavy emphasis on the length of the time span. As noted in a *New York Times Magazine* article on Bill Gates, Big History and David Christian, Christian states he was influenced by the Annales School, which encouraged the exploration of history on 'multiple scales of time and space'.²⁰ Fernand Braudel characterised three different timescales historians can use: 'traditional history, with its concern for the short time span' becomes, in the words of Paul Lacombe, 'the history of events'; a history that places 'cyclical movement in the forefront of its research' and covers periods of 'ten, twenty, fifty years at a stretch' becomes 'social history'; and, 'the history of the long, even of the very long time span' becomes 'the *longue durée*'.²¹ The *longue*

18 Ibid., pp. 227–229.

19 Ibid., pp. 238–242.

20 Andrew Ross Sorkin. 2014. 'So Bill Gates Has This Idea for a History Class ...' *New York Times Magazine*, 5 September. Accessed 3 June 2016: www.nytimes.com/2014/09/07/magazine/so-bill-gates-has-this-idea-for-a-history-class.html.

21 Fernand Braudel. 1980. 'History and the Social Sciences: The *Longue Durée*.' In *On History* by Fernand Braudel and trans. Sarah Matthews. London: George Weidenfeld and Nicolson Limited, p. 27.

durée is an apt description of Christian's opening sections, spanning billions of years over nearly 200 pages. While the *longue durée* is still utilised in later components, the periods where traditional historical records exist sees Christian engaging in other timescales of history.

In the analysis of how cities were established and expanded, Christian engages with 'social history', and outlines trends within these civilisations. The remaining parts of the book engage the development of the modern era utilising the *longue durée*, such as when Christian explores the development of trade routes, and at other points utilising social history, including developments within economics and innovation.

The problem with the timescales of Big History is that not only are they too large to allow for any sustained detailed analysis, but there is no grounding focus to anchor the timescales. Further, Christian seems uninterested in the history of events, and instead seeks to write a broader history with few detailed examples to place a greater emphasis on broader ideas that can be taken from different periods. The practice of the historian typically sees the historian being selective in their material in order to illustrate their argument. *Maps of Time* sees all information as necessary, which results in these vague generalisations about the past. Richard J. Evans notes, 'History ... can produce generalisation, though the broader they are, the more exceptions there are like to be and the further removed they will become from hard evidence'.²² By operating on a scale that does not allow for in-depth analysis of these hard facts, *Maps of Time* is reduced to these broad generalisations.

Of course, what separates Braudel's utilisation of the different timescales from Christian's is that Braudel has a specific geographical focus. His work utilising the different timescales is focused on the Mediterranean, resulting in the timescales being applied to a specific location and providing a focus to his historical work.²³ This focus is lacking in *Maps of Time*, which instead uses the *longue durée* on the entirety of what Christian believes to be 'history' and only

22 Richard J. Evans. 1997. 'History, Science and Morality.' In *In Defence of History* by Richard J. Evans, London: Granta Books, p. 60.

23 Fernand Braudel. 1980. 'The Mediterranean and the Mediterranean World in the Age of Phillip II: Extract from the Preface.' In *On History* by Fernand Braudel and trans. by Sarah Matthews. London: George Weidenfeld and Nicolson Limited, pp. 3–5.

engaging with ‘social history’ when there are enough sources to do so. This lack of a singular, specific focus results in Christian working in the broader time scopes of history and creates a text with minimal detailed historical analysis.

The greatest strength of *Maps of Time* lies in its ambition to attempt to unify all of human knowledge. What the book lacks in depth it certainly makes up for in breadth. Throughout the book, Christian presents a clear narrative, grounded in an academic longing for something bigger. His introduction is packed with idealistic reasons for Big History’s existence, including the ability for individuals to ‘find a role in the larger scheme of things’ and utilising Big History to construct ‘a more unified vision of history and of knowledge in general’.²⁴

Yet, while these ideals are admirable, it is difficult to read *Maps of Time* and not question whether history is the most appropriate discipline for this ‘larger project’ to be carried out in, which is a great weakness of the work.²⁵

Maps of Time raises questions about the nature of history, ranging from what sources help create history and the role of narrative within history. However, before these questions can be answered in relation to *Maps of Time*, a more fundamental question must be asked: Is *Maps of Time*, and by extension Big History, a work or a form of history? In order to judge whether *Maps of Time* and Big History is history, the question, What is History?, must be answered.

Many historians and writers have answered this question and, while there are differences, a collection of answers allows the formation of clearer picture of history. At the end of his first lecture in ‘What is History?’, E.H. Carr defines history as ‘a continuous process of interaction between the historian and his facts, an unending dialogue between the present and the past’.²⁶ He adds to this definition in the second lecture, noting, ‘we are entitled to by convention ... to reserve the word “history” for the process of enquiring into the past of man in society’.²⁷ In his essay ‘The Question of Narrative in Contemporary Historical Theory’, Hayden White posits that ‘the term history refers both to

24 Christian, *Maps of Time: An Introduction to Big History*, pp. 2, 5.

25 Ibid., p. 5.

26 E.H. Carr. 2001. ‘The Historian and His Facts.’ In *What is History?* by E.H. Carr. New York: Palgrave Macmillan, p. 24.

27 E.H. Carr. 2001. ‘Society and The Individual.’ In *What is History?* by E.H. Carr. New York: Palgrave Macmillan, p. 42.

an object of study and to an account of this object'.²⁸ Finally, in *In Defence of History*, Richard J. Evans notes that 'history clearly includes the study of individual people, events and structures as well as groups and collectives'.²⁹ He also notes G.R. Elton's perspective on historical facts being 'something that happened in the past, which had left traces in documents which could be used by the historian to reconstruct it in the present'.³⁰

From these definitions, we can summarise that history is a reconstruction created in the present by interrogating documents from the past. The word history can be used to describe both the act of history and the subject of history, but 'convention' suggests that it should be used primarily for the act.³¹ Further, there is a great emphasis placed on people, not only in the idea of the individual constructing history, but what the individual is constructing is at the very least in part constructed about humans by sources left behind that are often created by humans. Therefore this 'line' John Green previously referred to as the 'arbitrary' start of history wasn't created by historians, it was determined by the sources left behind by members of previous societies.³²

Does *Maps of Time* fit this definition? In looking at the terminology Christian uses throughout his book, it is easy to form the impression the entire book is history, even from the title. However, Christian's terminology misleads the reader and aids the creation of the idea of Big History being history. Christian consistently conflates the words 'history' and 'the past' and uses them interchangeably, even though they are referring to two different ideas. As established, history is the act of reconstructing the past using historical method, whereas the past is events that occurred before the present. Christian uses the term 'history' to refer to what ultimately is best described as a chronology of the past, where he simply lists events that occurred devoid of

28 Hayden White. 1987. 'The Question of Narrative in Contemporary Historical Theory.' In *Content of the Form* by Hayden White. Baltimore: Johns Hopkins University Press, p. 55.

29 Evans, 'History, Science and Morality', p. 57.

30 G.R. Elton in Richard J. Evans. 1997. 'Historians and their Facts.' In *In Defence of History* by Richard J. Evans. London: Granta Books, p. 75.

31 Carr, 'Society and The Individual', p. 42.

32 CrashCourse. 2014. 'The Big Bang: Crash Course Big History #1.' YouTube video, 14.24, 17 September, www.youtube.com/watch?v=tq6be-CZJ3w.

historical method and analysis. As Sam Wineburg notes, ‘At certain points, it becomes less history and more of a kind of evolutionary biology or quantum physics. It loses the compelling aspect that is at the heart of the word ‘history’.³³

If the version of history that Christian puts forward in the first half of his book amounts to a basic chronology of the past, it then transitions into what is arguably very broad World History in the second half. If the second half of *Maps of Time* was expanded to contain more analytical depth and engagement with traditional historical sources, or simply published on its own, the question of whether it is history or not would not be raised. Indeed, it would be considered a piece of World History, albeit still a broad piece. However, the book is being judged as a whole, and one cannot pick and choose the parts that are history. The entire book is written under the title of ‘history’ and, as a whole, the book fails that definition.

Additionally, the sources that Christian is interested in are primarily scientific or based on data. It is difficult to find many traditional historical sources in *Maps of Time*, ones that are written by humans that allow for individual interpretation. Wineburg asks: ‘When we think about history, what are the primary sources of Big History? The original scientific reports of the Big Bang?’³⁴ These questions tie into the criticism of Big History from Frank Furedi as being ‘anti-humanist’.³⁵ This focus on these forms of sources are excellent for drawing broader conclusions about different time periods, but does little to further its cause as history.

Further, *Maps of Time* concludes with the highly unhistorical practice of ‘predicting the future’.³⁶ While these predictions lie in analysis of where broader cycles and events, such as climate change, will evolve to, history is concerned with constructing the past from documents and records left from that time, not with constructing a hypothetical future.³⁷ As Evans notes, ‘history has proved a very bad predictor of future events. This is because history never repeats itself’.³⁸ Additionally, White notes that chronologies ‘typically promises

33 Sorkin, ‘So Bill Gates Has This Idea for a History Class ...’.

34 Ibid.

35 Furedi, ‘Big History: The Annihilation of Human Agency’.

36 Christian, *Maps of Time: An Introduction to Big History*, p. 490.

37 Ibid., pp. 478–479.

38 Evans, ‘History, Science and Morality’, p. 60.

closure but does not provide it'.³⁹ When the historian establishes their own timeframe, they can bring their narrative to its natural conclusion. In order to fulfil his aims, Christian must look to the future, resulting in a narrative that doesn't end with a unified conclusion and highlights the unhistorical nature of the text.

If *Maps of Time* isn't history, then what has been its influence? Surveying the ramifications of *Maps of Time*, its influence has been notable and not confined to the academic discipline of history. Big History projects have emerged, most notably with the establishment of the International Big History Association (IBHA) in 2010.⁴⁰ Here, individual works aren't necessarily carried out on the entirety of Big History, such as *Maps of Time*. Instead, individuals write on their particular fields under the paradigm of Big History, contributing to the expansion of detail within these Big History projects, something *Maps of Time* fails to cover.⁴¹ Further works about Big History have been published, including Eric Chaisson's *Epic of Evolution: Seven ages of the cosmos* in 2006, Cynthia Stokes Brown's *Big History: From the Big Bang to the present* in 2007 and Fred Spier's *Big History and the Future of Humanity* in 2010.⁴² While the IBHA aimed to start an academic journal dedicated to Big History, this is yet to occur. However, Ian Hesketh notes that more journal articles on Big History have been published particularly in the *Journal of World History*.⁴³ Additionally, universities have developed and taught courses on Big History. In Australia, Big History courses are taught institutions including Macquarie University and the University of Tasmania.⁴⁴

39 Hayden White. 1987. 'The Value of Narrativity in the Representation of Reality.' In *Content of the Form* by Hayden White. Baltimore: The Johns Hopkins University Press, p. 16.

40 International Big History Association. 'Origins and Purpose of the IBHA.' Accessed 3 June 2016: www.ibhanet.org/page-1252419.

41 International Big History Association. 'Links.' Accessed 3 June 2016: www.ibhanet.org/page-1362386.

42 Ibid.

43 Ian Hesketh. 2014. 'The Story of Big History.' *History of the Present* 4(2): 177. Accessed 3 June 2016: www.jstor.org/stable/10.5406/historypresent.4.2.0171.

44 Paul Turnbull. 2015. 'The Aims of Big History.' *History Compass* 13(7): 355. Accessed 3 June 2016: doi: 10.1111/hic3.12242; 'Big History,' University of Tasmania. Accessed 3 June 2016: www.utas.edu.au/courses/art/units/xbr203-big-history; 'Big History Institute,' Macquarie University, last modified 30 March 2016: bighistory.mq.edu.au/.

The influence of *Maps of Time* has been enhanced by the involvement of Microsoft founder Bill Gates, who became interested in the field after seeing Christian's early lectures.⁴⁵ In 2008, he approached Christian with his proposal to bring Big History into classrooms. Three years later, the Big History Project was established and 'debuted in five high schools'.⁴⁶ Today, the Big History Project lists 120 schools in six different countries as 'Big History Schools', including 29 high schools in Australia.⁴⁷ Further, in 2014, the Big History Project gave a grant to the YouTube channel 'Crash Course', an educational channel founded by brothers John and Hank Green, to create a mini-series on Big History.⁴⁸ This 10-part mini-series debuted on 17 September 2014 and concluded on 9 January 2015.⁴⁹ At the time of writing, this mini-series has over 7,379,600 views.⁵⁰

45 Sorkin, 'So Bill Gates Has This Idea for a History Class ...'.

46 Ibid.

47 Big History Project. 'Schools.' Accessed 3 June 2016: www.bighistoryproject.com/pages/schools.

48 vlogbrothers. 2014. 'Deserving.' YouTube video, 3.38, 20 May: www.youtube.com/watch?v=-VgLOAxq9xw; Big History Project. 'Big History Project FAQ 2014–15.' Accessed 3 June 2016: www.bighistoryproject.com/media/bhp-assets/BHP-FAQ-2014.pdf.

49 CrashCourse, 'The Big Bang: Crash Course Big History #1'; CrashCourse. 2015. 'The Deep Future: Crash Course Big History #10.' YouTube video, 13.30, 9 January: www.youtube.com/watch?v=kq1HUTLtNW4.

50 Number derived from view totals on the following videos: CrashCourse. 2014. 'Exploring the Universe: Crash Course Big History #2.' YouTube video, 14.36, 24 September: www.youtube.com/watch?v=Fi30zjQhtWY; CrashCourse. 2014. 'Human Evolution: Crash Course Big History #6.' YouTube video, 16.12, 5 November: www.youtube.com/watch?v=UPggkvB9_dc; CrashCourse. 2014. 'Life Begins: Crash Course Big History #4.' YouTube video, 13.28, 9 October: www.youtube.com/watch?v=1WS712DHfmg; CrashCourse. 2014. 'Migrations and Intensifications: Crash Course Big History #7.' YouTube video, 13.40, 26 November: www.youtube.com/watch?v=Oy2XJMczUNc; CrashCourse. 2014. 'The Anthropocene and the Near Future: Crash Course Big History #9.' YouTube video, 12.19, 11 December: www.youtube.com/watch?v=3WpaLt_Blr4; CrashCourse, 'The Big Bang: Crash Course Big History #1'; CrashCourse, 'The Deep Future: Crash Course Big History #10'; CrashCourse. 2014. 'The Evolutionary Epic: Crash Course Big History #5.' YouTube video, 15.04, 29 October 29: www.youtube.com/watch?v=92oHNd8vFwo; CrashCourse. 2014. 'The Modern Revolution: Crash Course Big History #8.' YouTube video, 13.57, 4 December: www.youtube.com/watch?v=Q4Zdmd4j7TI; CrashCourse. 2014. 'The Sun & The Earth: Crash Course Big History #3.' YouTube video, 14.32, 2 October: www.youtube.com/watch?v=By6CkTN4wkl.

The expansion of Big History into high schools is not a surprising turn of events. The Big History Project describes Christian as ‘the “father” of Big History’, which would make *Maps of Time* the ‘constitution’ of Big History.⁵¹ *Maps of Time* does read like a guidebook to how Big History should be taught in schools – with the six parts of *Maps of Time* forming different units within the course. Further, the lack of historical depth could provide room for teachers to explore in more detail the components of history that Christian fails to do in *Maps of Time*. These courses encourage students to think on a grander scale than they would normally be encouraged to, and provides a new paradigm for them to think through. Further, as noted in the *New York Times Magazine* article, Big History in schools is taught as a ‘hybrid course’, with an emphasis on its multidisciplinary nature, and not specifically as history.⁵²

The utilisation of Big History and *Maps of Time* as the beginning of a new way of thinking about knowledge and not history is the greatest strength of *Maps of Time*. It is difficult to categorise *Maps of Time*, and it is not difficult to see how the multidisciplinary book would be grouped under the interdisciplinary nature of history. As Christian himself notes, he sees *Maps of Time* as part of a ‘larger project’, and this project is best summarised as a new attitude towards collecting the entirety of human knowledge, and a new paradigm towards interpreting this knowledge.⁵³ Ultimately, *Maps of Time* presents a compelling narrative to encourage the exploration of knowledge on a grander scale, which was one of Christian’s aims. However, he does not write an account of the entire past and he does not consistently write using historical method, therefore not achieving some of his aims and producing a text that cannot be classified as history. However, part of the book uses historical method and, in the process, raises questions about the practice and discipline of history.

51 Big History Project. ‘Big History Project FAQ 2014–15.’ Accessed 3 June 2016: www.bighistoryproject.com/media/bhp-assets/BHP-FAQ-2014.pdf.

52 Sorkin, ‘So Bill Gates Has This Idea for a History Class ...’; Big History Project, ‘Big History Project FAQ 2014–15’.

53 Christian, *Maps of Time: An Introduction to Big History*, p. 5.

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My lecturer's cup

Lalit Prasad

Our first assignment in COMP2300 (Introduction to Computer Systems) instructed us to write a simple image filter in C, which would take in a user-provided image and input parameters and create a new image file with the desired filters added. It was compulsory to implement a black-and-white filter, and we were allowed to add as many other filters as we liked. I chose to add filters to change the image brightness and contrast, as well as a fun filter to produce a photo-negative.

Our assignment dealt with bitmap files, which primarily consist of a list of pixels with values indicating the brightness of red, green and blue within each pixel (ranging from 0 to 255). The standard approach to the problem was to first read the file to obtain the values of each pixel, then change the values as required, before finally writing these values to a new .bmp file.

Note that this becomes a little less straightforward when changing the dimensions of the image, for instance by cropping or rotating, as you cannot write the pixels to the output in the same order as in the original image. Indeed, after some thought as to how one might go about implementing such a filter, I decided that it was best left to the professionals and/or students with higher standards.

Most of the filters that I implemented were trivial, at least logically. For instance, my photo-negative filter simply inverted the colour of each pixel by subtracting each colour value from 255. To change the brightness, I multiplied each colour value by a non-negative ratio provided by the

user (of course capping the maximum possible value at 255). In a similar vein, my black-and-white filter set each pixel's colours to either (0,0,0) or (255,255,255), depending on its initial brightness.

The contrast filter was more difficult, as the changes to each pixel depended on the values of the other pixels in the image as well. Here, I first found the average brightness of the surrounding pixels, and then scaled each pixel's brightness away from that average to the extent supplied by the user, heightening the contrast of the image.

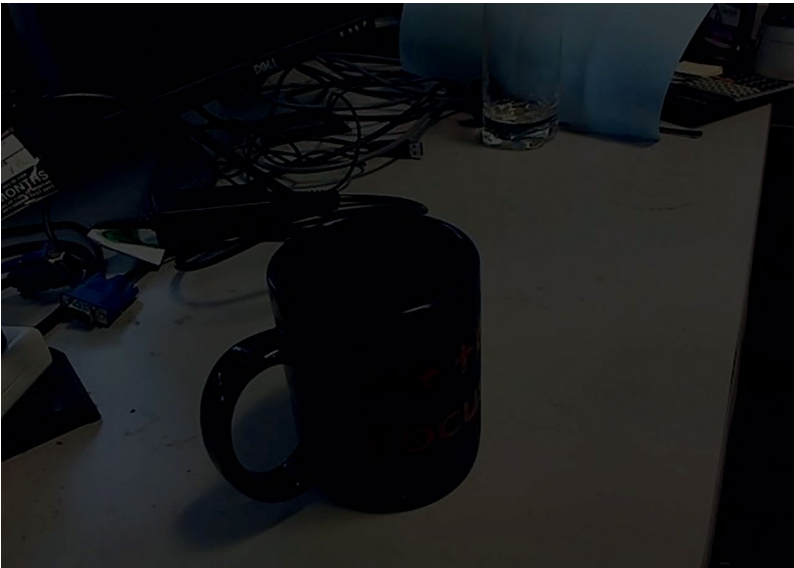
Overall, my submission for the assignment was not very ambitious as I shied away from the more complicated extensions, but my code was quite clean (take my word for it) and I am quite proud of the contrast filter in particular.



No filter



Photonegative



Half brightness



Contrast doubled



Black and white

The myth of the big bang

Lawrence Rogers

Abstract

Defining ‘myth’ is fraught with philosophical, political and linguistic challenges. This essay endeavours to explore the epistemological assumptions and characteristics that make up myth through comparing the modern aetiology of ‘the big bang’ and Hesiod’s *Theogony*. A survey has been conducted in conjunction with this essay to gain an understanding of the ways in which people today think about the big bang. Ultimately, the essay will conclude that *Theogony* and the big bang have many characteristics in common, and can arguably both be labelled as ‘myth’. Importantly, the epistemic background of the two aetiologies – the ways in which people *understand* myth – are often shared, as people use belief systems to comprehend these concepts. To explore the question this essay will first frame the established theoretical framework of ‘myth’. Amongst this discussion, a suitable definition by Lauri Honko will be chosen to further analyse and compare *Theogony* and the big bang. Implications of the analysis will then be given in relation to the definition of myth, focusing on the epistemic assumptions the word and concept holds.

Framing ‘myth’

There are many competing definitions and theories of myth. Lincoln rightly states that there is no ‘clear and concise definition of “myth”’.¹ Mythologists, folklorists, anthropologists and psychologists all have varying opinions on what and what does not count as myth.² Without going into too much detail, scholars usually differentiate their definitions of myth based on different aspects of myth. For example, Gaster highlights the interconnectedness of ritual and myth as its defining aspect.³ Malinowski identifies the importance of a function in society for myth.⁴ Kirk takes a generalist approach and goes as far as to say that ‘traditional oral tale’ is the only safe broad definition for what a myth is.⁵

A broad yet detailed definition given by Honko will be used throughout this essay. His definition identifies four criteria that make up myth: form, content, function and context.⁶ Under form, a myth is a narrative that can be verbal and may be supplemented by symbols, allusions and drama. A myth’s content is cosmogonic ‘information about decisive, creative events in the beginning of time’.⁷ The function of a myth is as an example or a model for behaviour and are integrated into a coherent view of the world. Finally, the context of myth is ritual, a pattern of behaviour sanctioned by usage.⁸ Honko’s definition is most useful because it encompasses a large range of characteristics of myth, which accounts for stories we may call myths that do not fit all of

1 B. Lincoln. 1999. *Theorizing Myth: Narrative, Ideology, and Scholarship*. Chicago: University of Chicago Press, p. xi.

2 William Bascom. 1984. ‘The Forms of Folklore: Prose Narratives.’ In *Sacred Narrative*, ed. Alan Dundes. Los Angeles: University of California Press; Jan De Vries. 1984. ‘Theories Concerning ‘Nature Myths.’ In *Sacred Narrative*, ed. Alan Dundes. Los Angeles: University of California Press; Lauri Honko. 1984. ‘The Problem of Defining Myth.’ In *Sacred Narrative*, ed. Alan Dundes. Los Angeles: University of California Press; G.S. Kirk. 1984. ‘On Defining Myths.’ In *Sacred Narrative*, ed. Alan Dundes. Los Angeles: University of California Press; Raffaele Pettazoni. 1984. ‘The Truth of Myth.’ In *Sacred Narrative*, ed. Alan Dundes. Los Angeles: University of California Press; Theodor H. Gaster. 1984. ‘Myth and Story.’ In *Sacred Narrative*, ed. Alan Dundes. Los Angeles: University of California Press.

3 Gaster, ‘Myth and Story’, pp. 112–13.

4 Bronislaw Malinowski. 1984. ‘The Role of Myth in Life.’ In *Sacred Narrative*, ed. Alan Dundes. Los Angeles: University of California Press, p. 197.

5 Kirk, ‘On Defining Myths’, p. 57.

6 Honko, ‘The Problem of Defining Myth, pp. 49–51.

7 Ibid., p. 50.

8 Ibid., p. 51.

the four criteria perfectly. This definition is better than Kirk's from above, as a 'traditional oral tale' does not give indication of the facets that make up 'myth'. Both Hesiod's *Theogony* and the 'big bang' will be compared and contrasted under the criteria established by Honko.

Analysis of the two aetiologies

Hesiod's *Theogony* fits easily within the four criteria. Its form is a clear narrative of how the universe began.⁹ Its stories are associated with images such as depictions of the Greek gods and their defining characteristics. Additionally, *Theogony* was in the form of a hexameter epic poem and was often recited to ancient audiences. These aspects all fit the content criteria. *Theogony*'s content also fits the definition as it tells the story of the beginning of the world – 'first of all Chasm came to be, and then broad breasted Earth'¹⁰ – along with the rest of the world's features and how Zeus came to rule the world order. In this way, Hesiod's story provides a cosmogenic depiction of the world. *Theogony* served an ontological function in Greek society. It established a static world order that society believed in, as Pan-Hellenic gods became codified. Its cosmogenic nature lent the function of the Greek polytheist faith system.¹¹ The final criteria – context – is also satisfied by *Theogony*. *Theogony* introduced and legitimised the ritual of sacrifice: 'human beings upon the earth burn white bones upon smoking alters for the immortals'. This ritual was used to bring the mythic past into the present and served to maintain the relationship between the gods and humankind.

The big bang is difficult to analyse due to its scientific nature. We aim to discuss the understanding of the big bang in the everyday person, rather than the understanding of an educated scientist. To isolate the concept to the 'layperson', a survey has been conducted that has sampled 87 people of all ages in Australia, of which 47 (54 per cent) could not explain any evidence of the big bang. It must also be understood that a large number of respondents will be highly educated, as the survey was primarily posted on a university social media group page. In relation to form of the big bang, it can be classified as

9 L. Maurizio. 2015. *Classical Mythology in Context*. USA: Oxford University Press.

10 Hesiod. 2006. *Theogony. Works and Days. Testimonia*, vol. 57, 503. Edited and translated by Glenn W. Most. Cambridge, Mass: Harvard University Press, pp. 116–7.

11 Hesiod, *Theogony*, p. xx.

a narrative. Over 70 per cent of respondents agreed that they could explain the big bang as a story or narrative. Additionally, respondents agreed that depictions of the big bang in media are dramatised, and often associate the concept of the big bang with images given by the media. The form criterion above is inclusive of images, and performative (audio-visual) formats, therefore the big bang fits it without too much difficulty. The big bang's content is cosmogenic, with 87 per cent of participants trusting that the big bang theory is the best account of the beginning of the universe. This complies with the content criteria.

The function of the big bang is unclear, however, there is room for exploration. The big bang certainly provides an integrated view of the world. As a cosmogony, it provides information for people to understand natural phenomena, and it can be argued that it can be placed into a holistic confidence in the scientific field – of which 86 per cent of participants trust to provide the best explanations for natural phenomena. Importantly, of those who could not explain any evidence for the big bang (54 per cent of all respondents), an overwhelming majority (40 of 47) still trust the scientific field to provide the best explanations of natural phenomenon. This leads to the notion that the epistemic system a layperson uses to understand the big bang is not grounded in reason, but instead faith or belief. The big bang then becomes a narrative with which a person can understand their everyday lives, where we came from, why we are here and how 'everything' begun. The layperson doesn't need or often doesn't have the desire to understand the formal reasoning behind the theory, and therefore it has a simpler explanatory function that is integrated into a larger worldview. The big bang can, therefore, satisfy the function criteria of myth.

The big bang does not fully satisfy the final criteria in relation to context. The big bang does not justify or provide 'ideological content for a sacred form of behaviour'.¹² This is partly due to its secular nature. There is no formal or indoctrinated meaning attached to the big bang theory that you might see in *Theogony*. Unless a leap is made to call scientific practice 'a sacred form of behaviour' based on the belief that a layperson has in it, or even 'ideological' the big bang does not contain the same context as a myth like Hesiod's *Theogony*.

12 Honko, 'The Problem of Defining Myth', p. 51.

Implications and criticisms

After evaluating the big bang under the criteria above, the big bang may be called a myth. This applies specifically to those who do not have an advanced understanding of the evidence behind the theory. The big bang's mythic qualities, therefore, may not be as strong as that of *Theogony* – and calling it a myth certainly wouldn't resonate in everyday usage. This has implications on the theoretical understanding of myth, and what scholars can use as appropriate analytical tools to study myth.

Taking into account 'modern myths' or 'modern aetiologies' may open up the study of myth. Hawes states that 'specific attitude towards mythology will create its own particular conception of the nature of myth which will, in turn, determine which stories should be considered "mythic"'.¹³ These attitudes towards myth may come from a particular scholar's background and what they study. For example, Malinowski was an anthropologist, and theorised myth through its cultural function, leading to his idea that myth is 'not symbolic but a direct expression of its subject matter'.¹⁴ Furthering this idea that defining myth is 'circular', this essay must have implicit biases by considering the big bang 'mythic'. To make these clear, this essay emphasises the importance of the epistemic system in the context of the form of the myth as its most defining characteristic. What makes the big bang a myth is the layperson's *belief* in it, with its associated narrative, content, and imagery. By loosening the definition of myth in this way, my own argument in this essay is strengthened, whereas if I used other definitions, my thesis may be invalidated. However, by shifting the importance of myth to that of its epistemic quality, a much wider range of narrative or stories may be considered myth and studied under that umbrella.

Demythologisation and ideology are important concepts in this discussion. Demythologisation is a term that describes a phenomenon in which what may be considered a myth is classified as something other.¹⁵ The best example to show this is the Christian Resurrection. Whilst Christian believers might be insulted if you were to call the Resurrection a myth, the story itself holds true to all of the previous criteria of myth. This phenomenon can occur under

13 Greta Hawes. 2014. *Rationalizing Myth in Antiquity*. Oxford, New York: Oxford University Press, p. 73.

14 Malinowski, 'The Role of Myth in Life', p.194.

15 Honko, 'The Problem of Defining Myth', p. 42.

three different methods: terminological; total and compensatory; and partial and interpretive. The most important of these that pertains to this discussion is terminological demythologisation. This is when the ‘word myth is avoided but the account, the story itself, is retained’.¹⁶ This act is certainly ideological in its nature – as by denying a narrative or account the title of ‘myth’, one is making a judgement on the nature and content of the account itself. Lincoln explores this idea, and states “‘myth’ asserts certain aspects of validity and authority compared to other forms of discourse’.¹⁷

The big bang often undergoes demythologisation, however, through the analysis given above it can be seen that it is valid to explore the account through a mythological perspective. The big bang – as a current and ‘scientific’ cosmogony – is immune to the term ‘myth’. The emphasis of this essay’s thesis, therefore, is on how the definition of myth, at least in academic circles, should be opened up to account for these ideological influences. If one can understand myth not through an ideological perspective or as a label of something invalid or untrue, one may explore a greater range of stories and accounts with the same or similar qualities. A myth is not just a ‘traditional oral tale’, but has an inherent epistemic belief system attached to it that makes up a part of its function. It is therefore not analytically useful to close off options for mythological study based on vogue ideological trends.

Conclusions

This essay and its research have a few obvious weaknesses. The survey conducted was not representative of the larger community of people in Australia, and could have been sampled to account for this. This may have been achieved through questions that delineated a respondent’s level of education, and their age. Additionally, the topic of defining myth is extremely large and has already been explored by experienced academics to a greater and deeper extent than the author has the knowledge to do. However, this essay has aimed to discuss some of the issues when defining myth by comparing a modern aetiology and an ancient one. Through this, it has been concluded that ideological aspects

¹⁶ Ibid.

¹⁷ Lincoln, *Theorizing Myth: Narrative, Ideology, and Scholarship*, p. 15.

that influence the definition of myth are limiting to analysis and distract from the essence of what myth is and that the definition should be more inclusive so as to account for a wider range of stories and narratives.

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Gaia: An astrometric solution

Jonah Hansen

Abstract

The European Space Agency (ESA) launched a mission, named *Gaia*, that recently released its first catalogue of data. In this essay, I detail why *Gaia* is important and how it is revolutionary to the field of astrometry (the study of the position and motions of celestial objects). I also describe various techniques for finding exoplanets and how no technique, with the exception of astrometry, can find the true mass of an exoplanet. Finally, I explain how *Gaia* may be one of the first missions to detect exoplanets with the astrometric technique and, by extension, find the true mass and distribution of exoplanets.

Introduction

Since the early days of science, the study of the positions of celestial objects, known as astrometry, has been a vital component of many advances and discoveries in astronomy. However, most instruments used to measure a stellar object's position have not had the precision required to discover and understand crucial theories concerning many astronomical bodies. The European Space Agency's recent space mission, *Gaia*, aims to revolutionise the field by providing an accurate and precise 3D map of all stars up to

a G magnitude of 20.7 mag.¹ With this extensive survey, it is likely that many discoveries will be made; in particular, the very first detection of exoplanets via the astrometric technique.

The *Gaia* mission

A star's position in the sky can be reported with six standard kinematic parameters: angular position (α, δ), proper motion (μ_α, μ_δ), parallax (π), and radial velocity (R_p). With many new, innovative techniques and advances in astronomical instrumentation, most of these parameters have been determined accurately with acceptable uncertainties. However, until 1997, finding the accurate parallax of a celestial object from the ground was extremely challenging, due to the major disturbances caused by Earth's atmosphere. Systematic errors also arose due to the need to correct from the relative ground-based parallax to absolute parallax.²

In 1997 the European Space Agency launched a satellite named HIPPARCOS, a reference to the father of trigonometry, which was designed to measure the absolute parallax of 117,995 objects with uncertainties of around a milli-arcsecond.³ These new accurate parallaxes proved invaluable to the field of astrometry and astronomy as a whole, allowing insights into the structure and formation of the Milky Way Galaxy. Nevertheless, HIPPARCOS had a very limited sample size, and so a new mission was devised to increase the number of stars with accurately known positions from 100,000 to over 1 billion.⁴

This new mission, called *Gaia*, was launched in 2013 with the aim to derive highly accurate kinematic parameters for all stars up to a magnitude of $G \approx 20.7$ mag.⁵ *Gaia*'s planned precision will completely change the field, providing uncertainties from $10\mu\text{as}$ for $G \approx 13$ mag to $600\mu\text{as}$ at $G \approx 20$ mag for all

1 Gaia Collaboration, Tino Prusti et al. 2016. 'The Gaia mission.' ArXiv e-prints, September. doi:10.1051/0004-6361/201629272.

2 Ibid.

3 Ibid.

4 Gaia Collaboration, Anthony G.A. Brown et al. 2016. 'Gaia Data Release 1. Summary of the astrometric, photometric and survey properties.' ArXiv e-prints, September. doi: 10.1051/0004-6361/201629512.

5 Gaia Collaboration, 'The Gaia mission'.

kinematic parameters excluding radial velocity.⁶ In addition, it will perform photometric and spectroscopic surveys of all sources, providing one of the biggest and most in-depth surveys of the Milky Way galaxy so far.

The *Gaia* spacecraft is located at the second Lagrange point (L2) of the Sun-Earth-Moon system, which has multiple benefits for the lifetime of the spacecraft, including stable temperatures and minimal radiation interference.⁷ At the L2 point, *Gaia* will have maximum viewing efficiency, with the Earth, Moon and Sun located outside of the field of view. In order for it to scan the sky in a highly efficient manner that allows uniform coverage, the spacecraft was put into a Lissajous-type orbit, with an orbital period of around 180 days.⁸

There are many astronomical fields in which *Gaia*'s astrometric survey will be of vital importance. One such field is galactic structure and dynamics. Through analysing the distribution and kinematics of both matter and dark matter in the Milky Way, *Gaia* will help to shed light on how the galaxy was formed and how it evolved into what is observed today.⁹ The fundamental question 'What is dark matter?' will also be addressed to some extent, potentially providing ground-breaking discoveries relevant to not just astronomy, but to physics as a whole. Other scientific mission objectives can be found in the Gaia Collaboration's 'The Gaia Mission' paper.¹⁰

However, what is one of the newest and most exciting prospects is in the field of exoplanets, where *Gaia* will assist in locating the first astrometrically determined exoplanets.

Exoplanet detection

Currently, there are multiple ways of detecting exoplanets, each with their own strengths and weaknesses. One of the first, and most used until recently, is the radial velocity technique, in which a star's radial velocity is measured using its spectrum's Doppler shift. If a planet were to orbit a star, then both

⁶ Ibid.

⁷ Ibid.

⁸ Ibid.

⁹ Ibid.

¹⁰ Ibid.

that star and planet would orbit their barycentre, causing the star to move along its radial velocity axis slightly. The radial velocity semi-amplitude, K , is given by the following equation derived by Lovis and Fischer:

Equation 1¹¹

$$K = \sqrt{\frac{G}{1-e^2}} \frac{m_p \sin i}{(m_s + m_p)^{2/3}}$$

Where m_s, m_p is the mass of the star and planet respectively, P is the period, i is the inclination, and e is the eccentricity of the orbit. As seen above, the true mass of the planet cannot be found due to the unknown inclination angle of the orbit, inhibiting studies on individual exoplanet systems. Another downfall is that the amplitude is inversely related to the period, and hence has a bias for systems with small periods, that is planets close to their host star.

In the past few years, NASA's Kepler spacecraft has detected at least 1,284 exoplanets using the transit technique, where a planet blocks the light of the host star as it passes in front of it.¹² While the transit technique by itself cannot determine the mass of a planet, it ensures that if the detection is followed up by a radial velocity investigation, the inclination of the system's orbit will be equal to 1.¹³ However, as seen in Equation 1, the planet's mass is still tied to the mass of the whole system, rendering it near impossible to determine the true mass without knowing external information about the star itself. Furthermore, the transit technique only produces results for planets with short periods and with an inclination of 1. This reduces the number of exoplanets with discoverable masses considerably.

This lack of a technique that reliably determines a planet's true mass is hindering the growth of the exoplanet field, preventing studies into the individual properties of exoplanets. The astrometric technique solves this problem by introducing a method that removes the dependence of inclination on an exoplanet system's mass. Similar to radial velocity, the astrometric method infers an exoplanet from the observations of a parent star orbiting

¹¹ Ibid.

¹² Timothy D. Morton et al. 2016. 'False Positive Probabilities for all Kepler Objects of Interest.' *The Astrophysical Journal* 882(2). doi:10.3847/0004-637X/822/2/86.

¹³ Wesley A. Traub and Ben R. Oppenheimer. 2010. 'Direct Imaging of Exoplanets.' In *Exoplanets*, ed. Sara Seager. Tucson: University of Arizona Press.

the barycentre.¹⁴ However, while the radial velocity technique only observes the radial component of the stellar motion, astrometry measures the projected orbit as an ellipse in the plane of the sky.

As provided by Perryman et al., the astrometric signature, which is the signal given in angular measure, is calculated from the formula below:

Equation 2¹⁵

$$\alpha = \left(\frac{M_p}{M_s}\right) \left(\frac{a_p}{1AU}\right) \left(\frac{d}{1pc}\right)^{-1} \text{ arcsec}$$

where a_p is the semi-major axis of the orbit ellipse with respect to the barycentre. As shown in Equation 2, the mass of the planet can be found without respect to its inclination. The full Keplerian orbit can also be determined from an astrometric measurement, as long as the object is viewed with respect to an absolute reference frame, as is the case with *Gaia*.¹⁶

The advantages of astrometry

The astrometric technique removes the bias towards planets with small periods; in fact, the signature scales linearly with a planet's distance from the parent star. This provides a unique opportunity to discover planets beyond the limit of radial velocity, in particular around the snow line.

The study of planets around the snow line, such as Jupiter in our own solar system, is crucial to the study of solar system formation, as the current formation model of the solar system states that gas giants can only form beyond this line.¹⁷ The validity of this model was threatened by the discovery of hot Jupiters – planets that are very close to their parent star but with very large radii. The current explanation for these planets is that they migrated

14 Andreas Quirrenbach. 2010. 'Astrometric Detection and Characterization of Exoplanets.' in *Exoplanets*, ed. Sara Seager. Tucson: University of Arizona Press.

15 Gaia Collaboration. 2016. 'Gaia Data Release 1. Summary of the astrometric, photometric and survey properties'.

16 Michael Perryman et al. 2014. 'Astrometric Exoplanet Detection with Gaia.' *The Astrophysical Journal* 797(1). [dx.doi.org/10.1088/0004-637X/797/1/14](https://doi.org/10.1088/0004-637X/797/1/14).

17 EDx Online Course Notes, 2015. 'Combined Reference Notes: Exoplanets Course.' courses.edx.org/courses/course-v1:ANUx+ANU-ASTRO2x+2T2016/info.

inward due to ripples in the proto-planetary disk but, if that is the case, either most giant planets are hot Jupiters, or the theory is incomplete.¹⁸ Studying the planets beyond this line is crucial to understanding these formation theories, and astrometry is currently the only technique posed to answer these questions.

However, perhaps the greatest use of astrometry is in complementing the other exoplanet-finding techniques, such as direct imaging or radial velocity. Once a star with an exoplanet is found via one of these techniques, a follow up with astrometry would provide vital data about the planet, including its true mass and its three-dimensional orbit.¹⁹ Once the true mass has been found, the density, surface gravity and atmosphere can be determined, with spectral investigations playing a role in the characterisation of the latter. This presents a very exciting opportunity to examine candidates for Earth-like planets in the habitable zones of stars to a greater extent than is possible today, possibly resulting in the discovery of the first exoplanet that could support life. As also revealed by Morton et al., the Kepler mission has reported many potential false-positives. These false-positives can be followed up through astrometric techniques, validating that the object is an exoplanet and not an eclipsing binary.²⁰

Astrometry is not without its weaknesses, primary among them being the sensitivity requirement of the instrument. To detect large planets, the astrometric signature required is .1mas, and for Earth-sized planets the astrometric signature can be in the sub $1\mu\text{s}$ range.²¹ In addition, for planets with large periods, which astrometry has a bias for, the observing time must become increasingly long to characterise the exoplanets to the same precision as planets with smaller periods. While *Gaia* will certainly provide astrometric sensitivity to detect massive planets with large semi-major axes, such as Jupiter and Saturn, a sizable proportion of Earth-sized planets may be out of range for the mission.²² Nevertheless, *Gaia* will be a vital component for the near future of exoplanet research.

18 Ibid.

19 Michael Shao et al. 2009. 'Astrometric Detection of Earthlike Planets.' Astro2010: The Astronomy and Astrophysics Decadal Survey, Science White Papers, 271, arxiv.org/abs/0904.0965.

20 Ibid.

21 Andreas Quirrenbach. 2010. 'Astrometric Detection and Characterization of Exoplanets.' in *Exoplanets*, ed. Sara Seager. Tucson: University of Arizona Press.

22 Gaia Collaboration, 'The Gaia mission'.

One of the strengths of *Gaia*'s mission is that as well as determining the distance and discerning the orbital motions for currently known exoplanet systems, it will take a survey of stars with varying types and ages.²³ This will produce an unbiased exoplanet search over a range of orbital periods that have not been well studied.

The precision to which the stellar parameters are measured is also critical, and hence, due to *Gaia*'s unprecedented astrometric sensitivity, it will be the first satellite to be precise enough to identify exoplanets using astrometric identification. Perryman et al. calculate that based on *Gaia*'s astrometric capabilities, around 21,000 planets at a distance up to 500pc will be detected, of which 1,000–1,500 will be detectable around M-dwarfs at a distance around 100pc. In addition, most of these will have clearly defined orbits, and while some of the long period systems may be poorly constrained, these can be improved with follow-up radial velocity observations.

With the large, unbiased survey of stars, *Gaia* is expected to provide a more reliable exoplanet population distribution, detailing the commonality of hot Jupiters and super-Earths, as well as detecting the frequency of exoplanets based on semi-major axis and host star type.²⁴ Furthermore, as detailed previously, *Gaia* should provide important revelations into the process of gas giant formation, possibly solving the problem concerning the large amount of hot Jupiters and testing the migration theory.

Perryman et al. also make a suggestion for the number of planets detected if *Gaia*'s mission length were to extend beyond the initial five years to a 10-year mission. Were this to be the case, the number of exoplanets detected and the quality of the determined orbits would drastically improve, producing an estimated 70,000 exoplanets over the mission period.

Conclusion

ESA's *Gaia* mission is sure to leave its mark on the field of astrometry and astronomy in general. Through its unprecedented precision of measuring stellar positions and velocities, it will produce vital data that will help in our

23 Michael Perryman et al. 2014. 'Astrometric Exoplanet Detection with *Gaia*.' *The Astrophysical Journal* 797(1). [dx.doi.org/10.1088/0004-637X/797/1/14](https://doi.org/10.1088/0004-637X/797/1/14).

24 Ibid.

understanding of the galaxy, specifically in the field of astrometric exoplanet detection. The discovery of around 21,000 exoplanets of stars of all types and sizes will allow astronomers to glean information about exoplanet formation, know the distribution of exoplanets, and it may even result in the holy grail of exoplanet astronomy: the detection of a planet that could sustain life.

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What defined war memories in Japan during the postwar period and what impact did they have on Japan?

Lucinda Fretwell

Abstract

This essay aimed to explore what defined and shaped Japanese war memories in the postwar period. Like the experience of war itself, Japanese war memories are diverse. Although there can be no monolithic definition of war memories in postwar Japan, there were features of the Japanese experience that played an important role in shaping and defining their memories of war. This essay argues that defeat, notions of victimhood and the Tokyo War Crimes tribunals were key features of the postwar experience that defined Japanese memories of war. It also sought to examine how war memories impacted Japan and argues that despite the diversity of war memories, they were responsible for creating Japan's commitment to peace and democracy.

Characterising Japanese war memories in the wake of the Second World War is no easy feat. Much like the experience of war itself, there is no monolithic definition of war memories. The orthodox understanding of Japanese war memory during the postwar period claims that Japan failed to acknowledge and address both its role as an aggressor and the atrocities it committed.¹ However, this view oversimplifies and fails to take into account the diverse

1 John Dower. 2012. *Ways of Forgetting, Ways of Remembering: Japan in the Modern World*. New York: The New Press, p. 105.

range of experiences and interlinked factors that shaped war memory in the postwar period. John Dower characterised this complex and diverse nature perfectly by describing war memory in Japan as a kaleidoscope.² Despite such variety, major features of Japanese experience did define and shape war memories during the postwar period. This essay examines the impact of three of these features – defeat, notions of victimhood and the Tokyo War Crimes Trials – in defining the range of war memories in the postwar period. Next it explores how Japan's experience and memory of war impacted its commitment to peace and democracy that has formed the basis of its identity and policy since the postwar period.

The defeat of Japan in 1945 had a profound impact on the development of its people's war memories in the postwar period. Defeat and demoralisation were the defining characteristics of postwar society.³ The war took its toll on citizens and by 1945 war weariness had well and truly sunk in. When the US-led Allied forces occupied Japan, they encountered not a resistant nationalistic nation as they had expected, but rather 'a populace sick of war ... all but overwhelmed by the difficulties of their present circumstances in a ruined land'.⁴ Japan had to come to terms with defeat. Most significantly it had to adapt the rhetoric of war into the rhetoric of the postwar, reconciling the fantasy with reality. The Asia-Pacific War had been presented as pure and noble, a kind of 'holy war' in which the Japanese people fought for their position in a future gloried world.⁵ This illusion 'fostered by political propaganda' emphasised 'the beauty of sacrifice, emperor worship, military valour' and presented the Japanese people as 'a race descended from the gods'.⁶ However, the reality of war and defeat, and the hardships of the postwar period eroded these idealistic images. Acknowledging defeat was 'traumatic' for the people, and this was reflected in a rhetoric of despair that emerged.⁷ Memories of war were tinged with the 'shame and dishonour' of unconditional surrender and the shock of defeat, but more significantly with the profound sense of exhaustion and despair that

2 Dower, *Ways of Forgetting, Ways of Remembering*, p. 106.

3 John Dower. 2000. *Embracing Defeat: Japan in the Wake of WWII*. WW Norton & Company/The New Press, p. 24.

4 Ibid.

5 Ibid., p. 104.

6 Ian Buruma. 1994. *The Wages of Guilt: Memories of War in Germany and Japan*. New York: Meridian, p. 53.

7 Dower, *Embracing Defeat*, p. 104.

plagued the population.⁸ This was known as the *Kyodatsu* condition. People of the postwar were known as the *Yakeato seidai*, or the burnt-out generation reflecting the 'nihilism and despair' that characterised literature and other popular culture of the era.⁹

Defeat and the challenges of living in postwar society fostered a desire in Japanese people to distance themselves from memories of the war – to 'forget the past and to transcend it'.¹⁰ In the immediate postwar period, living conditions were so bad it was easy to forget the recent past and focus instead on present survival.¹¹ In addition, during the occupation both Japanese and US-led Allied forces actively worked on 'reconceiving recent Japanese history'.¹² They worked with three major principles: that Japan could be reborn and 'history could begin as if anew'; that the recent war was a 'heroic narrative' with clearly identifiable victims and villains; and that Japan's journey to modernity had gone wrong, but could now be set right. These principles worked together to try and separate the war from the present in people's minds, creating a national approach of 'historical discontinuity'.¹³ One of the other key ways defeat defined people's memories of war was the question of how to approach the war dead, or as Dower puts it: 'What do you tell the dead when you lose?'¹⁴ This was the question that preoccupied most Japanese as they 'tried to absorb the issues of war responsibility, guilt, repentance, and atonement', grappling with the conflict between an 'intimate sense of bereavement' for those who died in the war, and the fact that because of defeat these people could not really be seen as 'heroes'.¹⁵ The challenges of coming to terms with defeat, and surviving immediately after the war, were a strong defining influence on the variety of Japanese war memories that developed in the postwar period.

Similarly, the notions of victimhood that emerged in the wake of defeat shaped the development of Japanese war memories. The 'pervasive sense of victim consciousness' in postwar Japan influenced people's recollections of the

8 Ibid., p. 104.

9 Buruma, *The Wages of Guilt*, p. 51.

10 Dower, *Embracing Defeat*, p. 24.

11 Carol Gluck. 1993. 'The Past in the Present.' In *Postwar Japan as History*, ed. Andrew Gordon. University of California Press, p. 69.

12 Ibid., pp. 69–70.

13 Gluck, 'The Past in the Present', p. 76.

14 Dower, *Embracing Defeat*, p. 486.

15 Dower, *Embracing Defeat*, p. 486; Dower, *Ways of Forgetting, Ways of Remembering*, pp. 108, 119.

Asia-Pacific War.¹⁶ First, there was a sense of victimhood created by US attacks on Japan during the war, which were made more painful by defeat. People who survived carried the death and destruction of the US bombing raids on 66 cities with them ‘as an intimate memory’.¹⁷ However, most significant in shaping this sense of victimhood were the atomic bombs dropped on Hiroshima and Nagasaki. Hiroshima, in particular, is often seen as the ‘supreme symbol of the Pacific War’, encapsulating ‘all the suffering of the Japanese people’.¹⁸ As the only country to have suffered atomic warfare, Japan had the opportunity to feel a unique sense of victimhood, which in turn fixated its people’s memory on their own war experiences and suffering rather than acknowledging their nation’s victimisation of others.¹⁹ Perhaps more significant though, Japanese people’s sense of themselves as victims of their war-hungry, militarist leaders. This perception of being deceived, brainwashed and manipulated by the state allowed many people to become immune to feelings of responsibility for the war, adopting the stance of an ‘innocent bystander’.²⁰ Finally, many Japanese people also saw themselves as victims of the hardship and poverty of the postwar period. Suffering and survival in the present allowed a kind of ‘historical amnesia’ to overtake Japan, which meant that even when the suffering of Japan’s victims was exposed it seemed ‘remote and abstract’, and hence easy to ignore.²¹

Although notions of victimhood were very dominant in the immediate postwar period, they did not always overshadowed memories of Japan’s aggression and war atrocities. During the Tokyo War Crimes trials, the United States actively tried to suppress general knowledge about the extent of Japanese war crimes, which meant that people were unable to wholly confront the past.²² However, as time went on and more people were exposed to the reality of Japanese savagery and aggression during the war, there were attempts to have these acknowledged more publicly. The most famous example is the Ienaga Saburo textbook controversy, in which the government tried to suppress publication

16 Dower, *Ways of Forgetting, Ways of Remembering*, p. 106.

17 Ibid., p. 106.

18 Buruma, *The Wages of Guilt*, p. 92.

19 Dower, *Ways of Forgetting, Ways of Remembering*, p. 144.

20 Dower, *Embracing Defeat*, pp. 504–5; Futamura Madoka. 2006. ‘Individual and Collective Guilt: Post-War Japan and the Tokyo War Crimes Tribunal.’ *European Review* 14(4): 474.

21 Dower, *Embracing Defeat*, pp. 29–30; Dower, *Ways of Forgetting, Ways of Remembering*, p. 120.

22 Dower, *Ways of Forgetting, Ways of Remembering*, pp. 123–4.

of information about various atrocities, arguing that they were too 'one-sided' and presented a negative image of the war.²³ Another significant example is the peace activists who fought to have Japanese aggression included alongside the horrors of Hiroshima at the Peace Memorial Museum in the 1980s.²⁴ Even though they were not successful in this, by the end of the postwar period, most Japanese people did acknowledge Japan's role as an aggressor.²⁵ Nagasaki and Hiroshima were still regarded by most Japanese as the 'preeminent moments of atrocity' in the Asia-Pacific War, but greater exposure of Japanese atrocities did reshape war memories.²⁶ Notions of victimhood, despite being challenged by knowledge of Japanese atrocities, certainly were a key factor that helped define memories of war in Japan during the postwar period.

A third factor that contributed to the variety of Japanese war memories in the postwar period were the Tokyo War Crimes Trials, which also helped solidify desires to split from the past and feelings of victim consciousness discussed above. The trials and the way they were publicised allowed people to distance themselves from the past and from Japanese war atrocities. This sentiment is reflected in an editorial published in *Asahi Shimbun*, which claimed that 'this trial demands the complete burial of the Japan of the past, which was coloured by the militarism that was cultivated by the defendants'.²⁷ The trials also reinforced the notions of victimhood in the population. By implicating only the military elite, the trials served to fuel the 'nation's anger towards and sense of detachment from wartime leadership' who they saw as deceitful.²⁸ However, the trials also developed victim consciousness in another way. The deep sense of suffering and victimisation created by the horrors and memories of the Second World War and the challenges of the immediate postwar period were intensified by the sense that Japan was being 'judged by standards that other nations do not apply to themselves'.²⁹ The trials, and what became known as 'Victor's Justice', were seen as a hypocrisy.³⁰ After all, the US terror and atomic bombings could also be judged as crimes against humanity, but it was not on trial. This disparity in justice set against the backdrop of suffering

23 Buruma, *The Wages of Guilt*, p. 189.

24 Ibid., pp. 1067.

25 Dower, *Ways of Forgetting, Ways of Remembering*, p. 110.

26 Ibid., pp. 159–60.

27 Quoted in Futamura, 'Individual and Collective Guilt', p. 473.

28 Futamura, 'Individual and Collective Guilt'. P. 473.

29 Dower, *Embracing Defeat*, p. 562.

30 Ibid., pp. 473–4.

in the postwar period reinforced ideas of victim consciousness and gave the impression that all of Japan was on trial.³¹ The Tokyo War Crimes Trials had a significant impact on defining Japanese war memories by reinforcing notions of victimhood and allowing people to distance themselves from the past.

The final section of this essay explores one very defining characteristic of postwar and contemporary Japan – its commitment to peace and democracy, which developed in response to memories of war. The Japanese peace movement began to take shape between 1949 and the mid-1950s. It was born out of ‘vivid’ memories of ‘the old war’ combined with the confrontation of the reality of the Cold War.³² After experiencing defeat, victimisation and ‘an overwhelming sense of powerlessness in the face of undreamed-of weapons of destruction’, Japan adopted ‘a new kind of antimilitary nationalism’.³³ Expressions of this were found at all levels of society and influenced most postwar politics.³⁴ Arguably most significant was the official renunciation of war found in Article 9 of the new Japanese Constitution. Peace became central to Japanese national identity. For example, people were able to internalise their national experience as ‘unique victims of the A-bomb’, and project their commitment to pacifism and a non-atomic peace universally as ‘apostles of the Hiroshima spirit’.³⁵ This commitment to peace and democracy allowed people to reconcile with their memories of war. For some this was ‘the only conceivable way by which the living could assure the dead that they had not perished in vain’.³⁶ It was the experience and memories of war and defeat, and that allowed ‘the great mantra of postwar Japan’, its commitment to peace and democracy, to develop.³⁷

Japanese experiences and memories of both the war and postwar periods are diverse. Therefore, there can be no monolithic explanation of what defined war memories in Japan during the postwar period. However, a range of major factors did influence and shape war memories in Japan during the postwar period. This essay examined three of these factors. The experience of defeat and all this entailed, notions of victimhood, and the Tokyo War Crimes Trials all

31 Futamura, ‘Individual and Collective Guilt’, pp. 475–6.

32 Dower, *Ways of Forgetting, Ways of Remembering*, p. 155.

33 Dower, *Embracing Defeat*, p. 494.

34 Dower, *Ways of Forgetting, Ways of Remembering*, pp. 130, 142.

35 Buruma, *The Wages of Guilt*, p. 104.

36 Dower, *Ways of Forgetting, Ways of Remembering*, p. 130.

37 Dower, *Embracing Defeat*, p. 30.

played very important roles in defining memories of war in Japan. They did not create a single memory, but rather helped define what John Dower described as the 'kaleidoscope of war memory' in postwar Japan.³⁸ Finally, these three factors and the way they influenced memory helped forge Japan's commitment to peace and democracy, which formed the basis of its national identity and policy in the postwar period and into the contemporary world.

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- Gluck, Carol. 1993. 'The Past in the Present.' In *Postwar Japan as History*, edited by Andrew Gordon. University of California Press.

38 Dower, *Ways of Forgetting, Ways of Remembering*, p. 106.

Human resource management practices in Japan: Are they really changing?

Meaghan Powell

The ‘typically Japanese’ ways in which Japanese companies have long arranged their human resource practices are certainly changing. However, due to the entrenched nature of these practices and the significance of culture and tradition in Japan, these changes are slow and somewhat limited.¹ This essay first explains the specific features of traditional Japanese human resource management practices. It then goes on to explore the economic environment of Japan and how this has informed the evolution of Japanese human resource management practices. The ways in which these traditional human resource practices are changing are then interrogated. It is clear that a tension exists in Japanese human resource practices between old and new: globalisation and economic factors have necessitated changes, however, traditional culture and ingrained mindsets, which inevitably inform human resource management practices, have resisted these changes. It is correct to say that Japanese human resource practices are really changing, however, these changes are limited in some respects.

1 Geert Hofstede, ‘What About Japan?’ Accessed 5 October 2016: geert-hofstede.com/japan.html.

Traditional Japanese human resource practices

Japanese culture is ancient and complex.² Its rich traditions have manifested in a system of unique human resource management practices. Some core features of Japanese human resource management include lifetime employment, seniority-based wage and promotion, and enterprise unionism.³ Other notable Japanese human resource management practices include a particular quality management system, consensus decision-making, employee loyalty to the company and a lack of gender equality in the workplace.⁴

Lifetime employment

Traditionally, Japanese companies recruit graduates and guarantee them employment with the company for the entirety of their career.⁵ There are a number of advantages to the practice of lifetime employment for both employees and the company. The company benefits as the stability of lifetime employment inspires devotion and loyalty in employees, which in turn generates improved employee performance.⁶ Employees are also provided with continual training in all areas of the company, making them versatile employees, with a range of skills and abilities that they can contribute to the company throughout their career.⁷ Lifetime employment also leads to a decreased turnover rate for the company, which means that talent is retained within the company, so the company receives a return on the human resources that it has invested in.⁸

2 Hofstede, 'What About Japan?'

3 Florent Chleide. 2015. 'Japanese Management: Cultural Challenges and Coping Strategies.' Master's thesis, Louvain School of Management, Université catholique de Louvain, hdl.handle.net/2078.1/thesis:3089.

4 Chleide, 'Japanese Management'.

5 Ibid.

6 Kristina Lazaridi. 2012. 'Particularities of Japanese Management.' *Journal of Business* 1(2): 29–34, journal.ibsu.edu.ge/index.php/jbm/article/view/386.

7 Chleide, 'Japanese Management'.

8 Ibid.

For employees, the primary advantage of lifetime employment is stability – employees are guaranteed to receive a pension after retirement.⁹ Lifetime employment also provides a strong platform for career development and steady salary increases.¹⁰

Seniority-based wage and promotion system

Hierarchy and respect for elders are key elements of Confucianism, a philosophy that strongly informs Japanese culture and religion.¹¹ This paradigm is reflected in the seniority-based wage and promotion practice in Japanese human resource management. As employees gain knowledge and experience over time in a company, they earn new opportunities such as promotions and wage increases.¹² The benefit of this system is that it guarantees career development and pay increases for employees who work in the company for a significant period of time.¹³ However, critics of the system argue that it ‘does not allow new talent to be merged with experience and those with specialised skills cannot be promoted to the already crowded executive ranks’.¹⁴

Enterprise unionism

Enterprise unions exist in almost every Japanese company, and act as an intermediary between staff (except management) and the company (management).¹⁵ The managers meet with the union to discuss issues such as salaries, strategies and employee rights.¹⁶ These issues are approached and resolved by both parties with harmony and cooperation as the guiding cultural values.¹⁷

9 Ibid.

10 Ibid.

11 ‘Confucianism.’ *New World Encyclopedia*, last modified 13 June 2013, www.newworldencyclopedia.org/entry/Confucianism.

12 Lazaridi, ‘Particularities of Japanese Management’.

13 Chleide, ‘Japanese Management’.

14 Ibid.

15 Lazaridi, ‘Particularities of Japanese Management’.

16 Chleide, ‘Japanese Management’.

17 Ibid.

Quality management system

High-quality production has been a key strength of the Japanese economy.¹⁸ This may be attributed to the focus on quality management in Japanese human resource practices. In Japanese companies, quality control circles are established, consisting of six to 12 employees (ranging from upper management to ordinary workers) on a voluntary basis.¹⁹ Meetings are held once a week, where employees in the circle express ideas about how to innovate at each stage of production, in order to increase the competitiveness of the company.²⁰ The benefit of quality control circles is that they foster mutual respect between members of the company at different ranks.²¹ The circles also encourage feedback and a variety of ideas from a range of members of the company, giving those who will most likely implement the ideas in the company – the workers – ownership of those ideas. This system fosters a collective sense of trust and commitment.

Consensus decision-making

There is an emphasis in Japanese culture and business on consensus decision-making; everyone in the company should collectively agree on the objectives and decisions of the company, and all conflict should be avoided.²² This consensus system is known in Japan as the ‘ringi system’ and is one of the most important human resource management practices in Japan.²³ Decisions are made with regard to the long-term impacts of such a decision, rather than just the immediate short-term impacts.²⁴ Japanese business decisions are made in a structured, logical and thoughtful process.²⁵

18 Ralf Bebenroth and Toshihiro Kanai (editors). 2011. *Challenges of Human Resource Management in Japan*. Oxford: Routledge.

19 Chleide, ‘Japanese Management’.

20 Ibid.

21 Ibid.

22 Ibid.

23 Lazaridi, ‘Particularities of Japanese Management’.

24 Chleide, ‘Japanese Management’.

25 Ibid.

Employee loyalty to his/her company

Companies in Japan are built upon the philosophy that employees in the company are 'family'.²⁶ Therefore, employees are extremely loyal to their company and place high importance on the performance of the company as a whole.²⁷ There is an overall collective mindset in the firm (and Japanese society at large) whereby individuals are rarely singled out for praise or blame.²⁸ Employees often work overtime without pay in order to contribute to the company's well-being: in 2013, 8.8 per cent of full-time employees worked more than 80 hours of monthly overtime.²⁹

Lack of gender equality in the workplace

Traditionally, women are not considered equal to men in the Japanese business environment. It is difficult for female graduates to find suitable work opportunities and it has been said that 'Japanese work customs make it almost impossible for women to have both a family and a career'.³⁰

A brief economic history of Japan and how this has influenced traditional Japanese human resource practices

These traditional Japanese human resource practices emerged over a long period of time, and have been informed significantly by global historic and economic events.

During the Second World War, Japan had strict labour market regulations and there was a significant divide between blue-collar and white-collar workers with respect to both wages and working conditions.³¹ In the postwar

26 Markus Pudelko and Anne-Wil Harzing. 2011. 'Japanese Human Resource Management: Inspirations from Abroad and Current Trends of Change.' In Bebenroth and Kanai, *Challenges of Human Resource Management in Japan*, London and New York: Routledge, pp. 28–60.

27 Chleide, 'Japanese Management'.

28 Ibid.

29 Ibid., p. 30.

30 Ibid., p. 38.

31 Chiaki Moriguchi. 2014. 'Japanese-Style Human Resource Management and Its Historical Origins.' *Japan Labor Review* 11(3): 58–77, hdl.voced.edu.au/10707/329209.

period, these distinctions between blue-collar and white-collar workers were broken down with the formation of employee unions – which included all employees.³² It was also during this period that the practice of lifetime employment emerged.³³

In the 1950s and 1960s, the Japanese economy experienced significant growth, with GDP per capita rising at an average rate of 7 per cent per year.³⁴ Throughout this high-growth period, the traditional Japanese human resource practices (outlined above) were developed. High growth allowed for a long-term mindset for business matters such as human resource management, which encouraged the development of practices such as emphasis on job security, career development and quality management systems.

In the 1980s, Japanese companies attracted attention globally as they were superior performers, boosted by the strong economic conditions in Japan.³⁵ Japan's unique human resource practices were regarded as central to the success of Japanese companies, and Western businesses were eager to learn and integrate Japan's approach to human resource management.³⁶

However, the Japanese economy suffered greatly in the 1990s due to the bursting of a speculative asset price bubble.³⁷ This led to a decade-long recession in Japan.³⁸ Along with this economic fall, globalisation emerged in the late 1980s and, as the world economy opened up, Japan faced competition from companies all over the world.³⁹ Combined with declining domestic demand, cost pressures for Japanese firms were intensified and efficiency was championed more than ever.⁴⁰ The recession of the 1990s was the beginning of the evolution of Japan's traditional human resource management model.⁴¹

32 Lazaridi, 'Particularities of Japanese Management'.

33 Moriguchi, 'Japanese-Style Human Resource Management'.

34 Ibid.

35 Bebenroth and Kanai, *Challenges of Human Resource Management in Japan*.

36 Ibid.

37 Moriguchi, 'Japanese-Style Human Resource Management'.

38 Ibid.

39 Ibid.

40 Ibid.

41 Ibid.

Ironically, Japan's traditional human resource management model, which had been seen as central to the success of Japanese companies in the 1980s, was now seen as a cause for Japan's economic woes and a barrier to efficiency.⁴² In the face of global competition and intense cost pressures, the 'typical Japanese' way of managing human resources began to change.

Despite experiencing hard economic times in the 1990s, as well as the global financial crisis in 2008 and a severe earthquake in 2011, Japan remains the most developed and second largest economy in Asia.⁴³ However, Japan does face some immediate economic challenges, primarily a rapidly ageing population.⁴⁴ This is problematic as it represents a reduction in the size of the workforce as well as increasing demands on health and welfare and concurrent decreases in tax revenues.

Changes to Japan's traditional human resource practices

A tension exists in Japanese human resource management between the traditional cultural mindset, and global competitive forces and efficiency mandates. Overall, we can conclude that human resource management practices in Japan are certainly changing, primarily due to Japan's poor economic performance in recent years and the influence of globalisation on competition. However, these changes are slow and limited in some respects by Japan's traditional cultural mindset and senior employees in particular.

Lifetime employment

Lifetime employment remains relatively common in Japan, with 35 per cent of Japanese employees guaranteed employment for life in 2011.⁴⁵ Although lifetime employment limits the flexibility and opportunities of one's career, the security it provides, particularly for families, remains very highly valued in Japanese culture. This is evident from the fact that lifetime employment is

42 Ibid.

43 Jodi Schneider et al. 2016. 'What's Wrong With Japan's Economy?' *Bloomberg*, 25 July 25: www.bloomberg.com/graphics/2016-japan-economy/.

44 Schneider, 'What's Wrong With Japan's Economy?'

45 Lazaridi, 'Particularities of Japanese Management'.

an entrenched custom rather than an explicit requirement in an employment contract – it is culturally ingrained and is therefore followed without need for legal enforcement.⁴⁶

However, when faced with cost pressures, lifetime employment does not lead to the best outcomes for companies or the Japanese economy; it may result in complacency, which leads to lack of incentives for innovation and efficiency of employees.⁴⁷ It also may result in an inefficient allocation of human resources, whereby the right person is not employed for the right job, but this cannot be changed due to the lifetime guarantee.

It is clear that lifetime employment is not economically viable, however, due to its cultural value and tradition, it remains relatively common in Japanese companies. One reason why it remains common is that senior employees who were hired upon the expectation of lifetime employment are not willing to change this expectation.⁴⁸ It is likely that lifetime employment will gradually decline as younger generations are employed, without the promise of lifetime employment. Indeed, younger employees have expressed a preference for a more flexible career path, rather than being confined to one company.⁴⁹

Overall, the practice of lifetime employment in Japan is supported by cultural traditions but is not supported by economic factors.

Seniority-based wage and promotion

Currently, 60–70 per cent of Japanese companies use a performance-based wage and promotion system.⁵⁰ However, human resource decisions based upon seniority remain prevalent, and many companies have encountered problems with the transition to a performance-based system, such as lack of acceptance by senior employees.⁵¹

46 Ibid.

47 Moriguchi, 'Japanese-Style Human Resource Management'.

48 Lazaridi, 'Particularities of Japanese Management'.

49 Ibid.

50 Tomohiko Okada. 2012. 'Human Resources Management in Japan: Before and After the 1990s.' Master's thesis, MIT, hdl.handle.net/1721.1/72939.

51 Okada, 'Human Resources Management in Japan'.

Due to the ageing of the population in Japan, the seniority-based wage system (having more senior employees receiving higher wages) increases labour costs.⁵² This notion supports the movement away from a seniority-based system and towards a performance-based system.

Furthermore, younger employees are resisting a system that does not reward ability and skill, but rather champions experience, which cannot be attained fast enough. Due to globalisation, opportunities to work for foreign companies with performance-based wage and promotion systems have become far more common in Japan.⁵³ This highlights the limitations of the seniority-based system, and increasingly attracts young Japanese talent. Japanese companies are being forced to change away from the seniority-based system in order to remain competitive on the global stage.⁵⁴

In summary, the seniority-based wage and promotion system is supported by Japanese culture and tradition, but it does not make economic sense.

Enterprise unionism

Enterprise unionism in Japanese companies is declining. The number of enterprise unions in Japan declined by 21 per cent between 1984–2006.⁵⁵ Reasons for this may include the growing importance of the service sector in Japan, which traditionally has lower union representation. In 2016, manufacturing represents only 21 per cent of Japan's GDP, while services represent 75 per cent.⁵⁶ The decline in enterprise unionism may also have been caused by the economic decline in the 1990s; during this period, enterprise unions lost their collective bargaining power as wages could not be increased due to weak demand.

52 Ibid.

53 Bebenroth and Kanai, *Challenges of Human Resource Management in Japan*.

54 Okada, 'Human Resources Management in Japan'.

55 John Benson and Philippe Debroux. 2004. 'The Changing Nature of Japanese Human Resource Management: The Impact of the Recession and the Asian Financial Crisis.' *International Studies of Management & Organization* 34(1): 32–51, www.jstor.org/stable/40397584.

56 Stanley White. 2016. 'Japan's services sector returns to modest growth in May, PMI at 50.4.' *Reuters*, 2 June: www.reuters.com/article/us-japan-economy-pmi-services-idUSKCN0YP07N.

Quality management systems

Quality control circles were championed as key to the success of Japanese companies in the 1980s. This quality management system attracted attention from Western countries that attempted to implement the system. However, in the West, 80 per cent of the sample companies that introduced quality circles abandoned them.⁵⁷ It became clear that the Japanese quality management system was suited only to the collectivistic nature of Japanese workers.⁵⁸ In a more individualistic society such as the USA, this quality management system seemed to identify people to blame for problems rather than identifying solutions to problems. It follows that quality management systems are not suited to individualistic cultures.

The younger generations in Japan are more individualistic than collectivistic; they have been referred to as the 'global generation', with some studies demonstrating that Japanese college students are more individualistic than even American college students.⁵⁹ It is likely, therefore, that quality management systems in Japan will decline over time. However, due to the remaining influence of senior workers, a collectivist attitude prevails in Japan, and the traditional quality management system in Japan continues to be utilised effectively.⁶⁰

Consensus decision-making

As outlined above, there has been an overall increase in individualistic behaviours in Japan, particularly among younger generations. Despite this, the ringi system continues to prevail in Japan, and is an ingrained mindset for Japanese society.⁶¹ This can prove challenging for international firms operating in Japan, as it is a specific and thorough decision-making process.⁶²

57 The Economist. 2009. 'Quality Circle.' *The Economist*, 4 November: www.economist.com/node/14301388.

58 The Economist, 'Quality Circle'.

59 Emiko Kobayashi, Harold K. Kerbo, and Susan F. Sharp. 2010. 'Differences in Individualistic and Collectivistic Tendencies among College Students in Japan and the United States.' *International Journal of Comparative Sociology* 51(1–2): 59–84. doi:10.1177/0020715209343424.

60 Chleide, 'Japanese Management'.

61 Lazaridi, 'Particularities of Japanese Management'.

62 Chleide, 'Japanese Management'.

Employee loyalty to his/her company

Loyalty continues to be valued extremely highly by managers in Japan and is fundamental in Japanese culture due to the prevailing influence of Confucian philosophy.⁶³ However, it is likely that employee loyalty will decline in alignment with lifetime employment. It is arguable that the younger generations in Japan value flexibility and diverse career experiences over loyalty to one company.⁶⁴ Furthermore, globalisation has meant that Japanese companies have internationalised and global firms have entered Japan, bringing alternative human resource management practices.⁶⁵ For example, Takeda Pharmaceutical Company – the largest pharmaceutical company in Japan – now has a non-Japanese president for the first time since 1781, as well as a number of other executives who are not Japanese.⁶⁶ This indicates a very significant change in Japan's human resource management practices; it signifies the globalisation – or Westernisation – of Japanese human resources and human resource practices.

Lack of gender equality in the workplace

Gender equality in the workplace in Japan is far behind the Western world.⁶⁷ Female participation in the labour force is 63 per cent and 70 per cent of women stop working after they have children, compared with 30 per cent in the USA.⁶⁸ This is set to change, as promised by the Japanese Prime Minister Shinzō Abe; due to Japan's shrinking workforce, female participation in the labour force is critical for the improvement of Japan's economic performance.⁶⁹ This change is likely to be slow due to ingrained culture, family traditions and expectations of women.

63 'Confucianism'.

64 Lazaridi, 'Particularities of Japanese Management'.

65 Bebenroth and Kanai, *Challenges of Human Resource Management in Japan*.

66 Chleide, 'Japanese Management', p. 25.

67 The Economist. 2014. 'Holding Back Half the Nation; Japanese Women and Work.' *The Economist*, 29 March: www.economist.com/news/briefing/21599763-womens-lowly-status-japanese-workplace-has-barely-improved-decades-and-country.

68 The Economist, 'Holding Back Half the Nation'.

69 Ibid.

Conclusion

The ‘typically Japanese’ ways in which Japanese companies have long arranged their human resource practices are certainly changing. These changes are influenced by both the traditional Japanese cultural mindset and global competitive and economic forces. These influences are often in tension, thereby limiting the rate at which Japanese human resource practices can change and evolve.

Lifetime employment is declining but it remains evident in Japanese companies. It is supported by cultural traditions but is not economically viable. Similarly, the seniority-based wage and promotion system is also declining. Indeed, this system has largely been replaced by a performance-based system. This practice is also not economically viable – especially due to the ageing population in Japan – but it is retained due to tradition and the cultural influence of senior employees in Japanese companies. Enterprise unionism has also declined throughout the difficult economic period of the 1990s in Japan. The Japanese quality management system and employee loyalty are both set to change gradually, as younger generations in Japan gain greater influence and authority, and demonstrate more individualistic characteristics in the workplace and their careers in general. Consensus decision-making and gender roles in the workplace are arguably the slowest changing human resource practices in Japan; they represent deeply ingrained cultural practices as well as human resource management practices in Japan.⁷⁰ Despite this, an increase of female participation in the Japanese labour force is critical for the Japanese economy and would greatly benefit Japanese business and wider society.⁷¹

In conclusion, it is clear that the ‘typically Japanese’ human resource management practices are changing. These changes are slow and somewhat limited, but at the same time, they are inevitable as globalisation and younger Japanese generations exert influence in Japan.

⁷⁰ Ibid.

⁷¹ Ibid.

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The Rape of the Lock

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Abstract

In *The Rape of the Lock*, Pope satirises the trivialities of London high society and the absurdities of epic conventions. The mock-epic style allows him to ridicule the poem's characters by ostensibly elevating their petty disputes and jealousies into a grand narrative. The poem both conforms to, and perhaps mockingly subverts, traditional gendered roles, as Belinda is shown both as a hero, or goddess, arming herself for battle and as a frivolous and vain woman. Yet in adapting the conventions of epic to the world of eighteenth-century London, Pope also draws attention to the absurdities and contradictions that are present in epic poetry. He examines the feminisation of epic heroes, and depicts tensions between male and female roles. Pope thus exposes the frivolity of men and women in his society, and also confronts anxieties about women desiring power over men.

The Rape of the Lock mocks the triviality of eighteenth-century London society, yet also exposes the inherent absurdities of epic poetry itself. Belinda is credulous and almost infantilised, but is nevertheless the central character of the poem. Belinda's importance could be part of Pope's subversion of epic, as he suggests that it is unnatural for women and their 'soft bosoms' to experience the epic quality of 'mighty rage'.¹ It is significant that this line

1 Alexander Pope. 1993. 'The Rape of the Lock.' In *The Oxford Authors: Alexander Pope*, ed. Pat Rogers, 77–100. Oxford: Oxford University Press, 1.12. Further references to canto and line numbers are given in text, as *RL*.

recalls the phrase at the beginning of the *Aeneid*, ‘Can heavenly spirits cherish resentment so dire?’² Belinda’s rage here is mockingly compared to that of the goddess Juno, who attempts to thwart Aeneas’ journey to Italy. Belinda’s fury at the loss of her lock of hair is also similar to that of Dido, Queen of Carthage, whom Juno attempts to protect. The beginning of Canto IV, ‘But anxious care the pensive nymph oppressed’, recalls Book IV of the *Aeneid*, which, in Dryden’s translation, opens with the line, ‘But anxious cares already seized the Queen’.³ Pope mockingly compares Belinda’s rage to Dido’s frenzied despair when Aeneas abandons her. Belinda’s ‘screams of horror’, which ‘rend the affrighted skies’ when her hair is cut, resemble the ‘loud cries’ with which ‘the sounding palace shook’ and which ‘mount the vaulted skies’ at Dido’s suicide (*RL*, 3.156; *A.*, 955, 961).

Moreover, Belinda’s loss of the lock and Dido’s suicide are compared to the fall of a great city. Pope likens the Baron’s scissors to ‘steel’ that could ‘strike to dust the imperial towers of Troy’ (*RL*, 3.173–74), while the lamentations following Dido’s death are compared to the ‘clamour’ of ‘ancient Tyre’ or ‘new Carthage, set by foes on fire’ (*A.*, 962–63). This similarity implies that Pope is mocking not only Belinda’s hyperbole but also the extravagant emotions of true epic poetry. Pope could be suggesting that Dido’s extreme reaction to Aeneas’ departure is in some ways as overblown as Belinda’s. Indeed, Williams has argued that Pope was aware that classical epic could contain moments of ‘the trivial or burlesque’.⁴ In the dedication, Pope states that ‘the ancient poets’ make incidents ‘appear of the utmost importance’ that are ‘never so trivial in themselves’.⁵ Although this is evidently a jocular passage, it could also indicate that Pope was aware that epic poetry itself could be a target for mockery.

Weinbrot has shown that criticisms of epic poetry, and especially of Homer’s, became more common throughout the seventeenth century. Homer’s plots were regarded as weak and incoherent, and the language of the gods and heroes

2 Virgil. 1916. *Eclogues. Georgics. Aeneid: Books 1–6*. Trans. H. Rushton Fairclough, rev. by G.P. Goold. Loeb Classical Library 63. Cambridge, MA: Harvard University Press, 1.11.

3 John Dryden. 1987. ‘The Fourth Books of the Aeneis.’ In *The Works of Virgil in English*, ed. William Frost. Berkeley, CA: University of California Press, 4.1 Further references to line numbers are given in text, as *A.*

4 Carolyn D. Williams. 1990. ‘Breaking Decorums: Belinda, Bays and Epic Effeminacy.’ In *Pope: New Contexts*, ed. David Fairer. Hemel Hempstead, Herts: Harvester Wheatsheaf, p. 70.

5 Alexander Pope. 1993. Dedication to ‘The Rape of the Lock.’ In *The Oxford Authors: Alexander Pope*, ed. Pat Rogers, 77–100. Oxford: Oxford University Press, pp. 77–78.

as insufficiently elevated. Both the gods and men were seen as barbarous and cruel, and the graphic descriptions of warfare distasteful.⁶ Thus, Pope's use of epic conventions is not altogether positive, and the contrast between modern and ancient ways of life sometimes reflects poorly on both. The syntactical inversion of the opening lines, ending with 'I sing', recalls the opening line of the *Aeneid*, 'arma virumque cano'.⁷ Pope ostensibly sets out to explore not arms and the deeds of men, but the petty disputes of upper-class men and women in contemporary London. The incongruity between Belinda's confined world of bedroom, boudoir and court, and the epic scale of her beauty and her emotions demonstrates the superficiality of Belinda's world.

Pope describes Belinda as a 'goddess' decked with 'glittering spoil', arming herself for battle (*RL*, 1.132). The scene mockingly recalls heroes equipping themselves for battle. Belinda's petticoat is imaged as a 'seven-fold fence' that is 'stiff with hoops, and armed with ribs of whale' and has a 'silver bound' (*RL*, 2.119–21). This protective undergarment resembles the shields of epic heroes, including Ajax's 'sevenfold shield', and Achilles' 'broad shield', which is surrounded by 'living silver'.⁸ The comparison of a warrior's shield to a woman's petticoat connotes the inconsequentiality of Belinda's world. Yet it is important to note that Achilles' shield is extremely decorative and, like Belinda's dress, seems designed for show as much as for protection. Achilles' armour was forged, at Thetis' request, by Vulcan, who claims that Achilles would have the 'most envy'd Arms, the Gaze/Of wondering Ages and the World's Amaze!' (*Il.* 18.535–36). Indeed, Achilles is frequently feminised by his association with appearance and disguise.⁹ Although not present in the *Iliad*, the story of Achilles' mother Thetis disguising him as a girl in order to protect him from the war was well known at the time.¹⁰ Thus, in drawing similarities between the epic hero and the frivolous Belinda, Pope exposes both characters' absurd interest in outward show and blurs the distinctions between feminine and masculine behaviour.

6 Howard D. Weinbrot. 1988. 'The Rape of the Lock and the Contexts of Warfare.' In *Eighteenth-Century Satire: Essays on Text and Context from Dryden to Peter Pindar*, 100–119. Cambridge: Cambridge University Press, pp. 101–3.

7 Virgil, *Eclogues. Georgics. Aeneid: Books 1–6*, 1.1.

8 Alexander Pope. 1967. *The Iliad of Homer: Books I–IX*, ed. Maynard Mack. London: Methuen, 7.296; Alexander Pope. 1967. *The Iliad of Homer: Books X–XXIV*, ed. Maynard Mack. London: Methuen, 18.701–3. Further references to book and line numbers are given in text, as *Il.*

9 Carolyn D. Williams. 1993. *Pope, Homer, and Manliness*. London: Routledge, pp. 176–7.

10 Williams, 'Breaking Decorums', p. 63.

Moreover, the dispute between the Baron and Belinda mirrors Agamemnon and Achilles' struggle over the slave-girl Briseis.¹¹ Achilles experiences a blow to his pride when Briseis is snatched away, just as Belinda is perceived to have lost her honour when her lock is cut. By comparing Achilles' rage, which fuels much of the *Iliad*, to a drawing-room quarrel, Pope deflates Belinda's and Achilles' histrionics. He thus underlines the similarities between the extravagant emotions of epic and the excessive reactions of the characters in *The Rape of the Lock*. Indeed, Ferguson argues that Pope's depiction of the ramifications of his characters' anger and fear resemble those of the *Iliad*.¹² Just as Achilles sheds 'tears of anger and disdain' (*Il.*, 1.458), Belinda feels 'rage, resentment and despair' at the cutting of her lock (*RL*, 4.9). Belinda, like Achilles, surrenders to her passion, which can ultimately only be detrimental to her. Pope disapprovingly wrote in a note to his translation of the *Iliad* that Achilles 'lets his anger prevail' over his desire for glory (*Il.*, 9.530n). Indeed, Pope maintained that 'the chief moral of Homer was to expose the ill-effects of discord', and that Achilles' anger is contrasted with the perfectly manly Hector, who is 'unruffled by rage' and displays 'temperance' (*Il.*, 3.53n). Pope's disdain for Achilles' feminised emotions could demonstrate his anxieties about epic poetry, which did not always present truly masculine heroes. Thus, Williams argues that *The Rape of the Lock* illustrates the entwining of the trivial and the serious in epic poetry.¹³

The Baron is also depicted as an effete and rather feckless man of the court.¹⁴ He needs female assistance to be able to cut Belinda's lock, as Clarissa 'present[s] the spear' and 'arm[s] him for the fight' (*RL*, 3.130). This perhaps recalls Thetis offering Achilles his armour, and Venus arming Aeneas. The Baron's triumphant speech after the cutting of the lock recalls Achilles' oath that he would no longer fight for the Greeks after his dispute with Agamemnon. The Baron swears 'on this sacred lock', just as Achilles vows 'by this sacred sceptre' (*RL*, 4.133; *Il.*, 1.309). Thus, the prize of Belinda's hair is compared to an object of religious authority, suggesting both the Baron's power over Belinda but also his overweening passion. Yet the comparison is ironic, since

11 George deForest Lord. 1987. *Classical Presences in Seventeenth-Century Poetry*. New Haven: Yale University Press, p. 173.

12 Sarah Ferguson. 1986. *The Unbalanced Mind: Pope and the Rule of Passion*. Philadelphia: University of Pennsylvania Press, p. 42.

13 Williams, 'Breaking Decorums', p. 70.

14 David B. Morris. 1984. *Alexander Pope: The Genius of Sense*. Cambridge, MA: Harvard University Press, pp. 92–3.

Achilles swears not to fight, while the Baron's oath provokes a parodic battle between the sexes. The sexual innuendo of the Baron who 'sought no more than on his foe to die' mocks the polite society in which men can be 'killed ... with a frown' (*RL*, 5.78, 68). Pope also continues to expose the absurdities of epic itself. The war of the *Iliad* stems from causes not entirely removed from those of *The Rape of the Lock* – a beauty contest between three goddesses and the abduction or seduction of Helen.¹⁵ As we have seen, heroes such as Achilles and Agamemnon are interested not only in prowess on the battlefield but also in the possession and conquest of women. Thus, in his parody of an epic battle, Pope exposes the similarities as well as incongruities between the battlefield and the court. He discloses the contradictory and exaggerated emotionality of traditional epic poetry, while simultaneously deflating the importance of contemporary society and its ridiculous preoccupations.

In tandem with his feminisation of epic heroes and of the Baron, Pope explores the trivial and ultimately powerless lives of women in eighteenth-century society. He attacks women as commercial and shallow, and suggests that they use religion as a part of their adornment. The 'cosmetic powers' that Belinda 'adores/With head uncovered', in a mockery of a religious ceremony, suggest society's worship of the veneer of appearance (*RL*, 1. 123–24). The intrusion of 'bibles' in the otherwise alliterative catalogue of '[p]uffs, powders, patches' reinforces the superficiality of religion in Belinda's society (*RL*, 1.138). The purportedly religious nature of society is constantly undercut by sacrilegious uses of Christian symbolism and overtly pagan references. Belinda's divine appearance as one who is the 'rival of [the Sun's] beams' portrays her as an idol to be worshipped, perhaps above God (*RL*, 2.3). Indeed, Belinda treats a sacred object as an ornament in wearing her 'sparkling cross', which 'Jews might kiss and infidels adore' (*RL*, 2.7–8). Belinda's blend of Christian and pagan religion is also evident in her despairing speech after the 'rape'. She begins by lamenting that she should have 'said [her] prayers at home', yet immediately afterwards turns to a superstitious belief in 'omens' and 'mystic visions' in an attempt to understand her fate (*RL*, 4.160–61, 166).

Pope's presentation of the sylphs and gnomes also melds different belief systems, as the supernatural creatures seem to be modelled both on Olympian deities and on Milton's angels and devils. Ferguson has argued that 'superstition' is the

15 Helen Deutsch, 1996. *Resemblance and Disgrace: Alexander Pope and the Deformation of Culture*. Cambridge, MA: Harvard University Press, p. 41.

main governing force of these beings, who instil 'destructive passions' into the characters of the poem.¹⁶ Yet there are also significant parallels between Ariel and Satan, especially in Ariel's speech to Belinda in her dream, which resembles Satan's temptation of Eve.¹⁷ Ariel flatters Belinda, telling her that she is the 'fairest of mortals' and that she should '[her] own importance know' (*RL*, 1.27, 35). This echoes Satan's blandishments in *Paradise Lost* in which he claims that there is 'no fair to [Eve's]/equivalent or second' and that she should be 'a goddess among gods' and 'empress of this fair world'.¹⁸ Ariel's repetition of the word 'know', as he tells Belinda to 'know, then' and 'know further yet', recalls the serpent tempting Eve with knowledge (*RL*, 1.41, 67).

Ariel's confidences turn out to be just as false as Satan's guileful words. Ariel speaks disingenuously when he reassures Belinda that she is being looked after by a 'thousand bright inhabitants of air', since Ariel and the sylphs will abandon Belinda when she is in danger from the Baron (*RL*, 1.28). Moreover, Ariel sets himself to be 'the guard of Shock', leaving Belinda's 'favourite lock' to the diminutively named sylph Crispissa (*RL*, 2.115–16). Ariel's satanic power over Belinda could suggest that she is a victim of a society that forces women into frivolity and flirtatiousness. The curl of Belinda's lock could even recall Eve's 'golden tresses' that 'in wanton ringlets waved' (*PL*, 4.305–6). Eve's hair seems here to almost prefigure her temptation and fall, as 'wanton' implies both 'unrestrained', but also immodest or lustful.¹⁹ Belinda's 'shining ringlets' and 'fair tresses' similarly demonstrate her dissipation, since it is they that 'ensnare' the Baron, suggesting Belinda's role as temptress (*RL*, 2.22, 27). Indeed, Fairer argues that the curl of Belinda's hair also recalls Satan's sinuous movements as he entangles Eve in sin.²⁰

In her Eve-like longing for supremacy, Belinda demonstrates male anxieties about female power, especially as it might be used to entrap men. During the round of ombre, Belinda initially revels in her role of goddess, biblically crying, 'Let Spades be trumps!' (*RL*, 3.16). Her eventual triumph implies

16 Ferguson, *Unbalanced Mind*, p. 42.

17 Kent Beyette. 1976. 'Milton and Pope's *The Rape of the Lock*.' *Studies in English Literature, 1500–1900* 16(3): 426.

18 John Milton. 2004. *Paradise Lost*, ed. Stephen Orgel and Jonathon Goldberg. Oxford: Oxford University Press, 9.608–9, 547, 567. Further references to book and line numbers are given in text, as *PL*.

19 Milton, *Paradise Lost*, 4.306n.

20 David Fairer. 1979. 'Imagination in *The Rape of the Lock*,' *Essays in Criticism* 29(1): 65.

a sexual dominance, as the Baron's Ace of Hearts is crushed by Belinda's card, which 'falls like thunder on the prostrate Ace' (*RL*, 3. 98). Belinda celebrates her triumph in a suitably deific manner, as her 'exulting fills with shouts the sky', while the 'walls, the woods, and long canals reply', just as natural features echo shouts in epic poetry (*RL*, 3.99). Yet she does not long enjoy her celebratory feast before she is punished for her pride and for her attempt to usurp masculine power. Moreover, Umbriel's collection of '[s]ighs, sobs, and passions', which he gathers during his mock descent to the Underworld, removes all agency from Belinda, and makes sure that she will succumb to her feminine emotions (*RL*, 4.86). In this respect, she resembles epic heroes and heroines whose lives are dictated by the gods, rather than Adam and Eve who are supposed to be 'free to fall' (*PL*, 3.99). The final stellification of Belinda's hair reminds the reader once again of the absurd pretensions of Belinda and her society. Yet it also makes clear just how narrow the gap is between the absurd events of *The Rape of the Lock* and those of epic and classical poetry.

Pope thus constructs a poem that mocks the extravagant affectations of eighteenth-century society and of epic heroes and heroines. Pope satirises Belinda's emotionality and obsession with her appearance, but makes it clear that the characters of epic poetry share these same qualities. He also discloses anxieties about gender roles and the questionable masculinity of epic heroes. Ultimately, Pope achieves a satiric portrayal of the trivial and superficial concerns of men and women, whether in ancient or contemporary times.

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