FACULTY RESEARCH AWARD APPLICATION – 2023-2024

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Research Project
    Title: Researching Morality: Methods from Historical Psychology
    Start Date: July 1, 2023
    End Date: June 30, 2024
    Budget Requested from MBB: 50K
    Are other funds available for this project?: _____ Yes   __X__No
    If yes, what source(s)? What is the total amount available from other sources?

Please check the applicable box or boxes. This is an application for support for:
    X   Postdoctoral Fellow
    ☐   Visiting Research Fellow
    ☐   Research Assistant
    ☐   Research Equipment or Supplies
    ☐   Subject Fees
    ☐   Interdisciplinary Workshops, Conferences, or Seminars
    ☐   Other - Please explain in a few sentences

As you complete the following sections of this application

1. Please know that your proposal will be reviewed by a committee whose members are drawn from a variety of disciplines. Please avoid specialized discipline-specific vocabulary whenever possible. Where such terminology or language is felt to be required, please define usage in language appropriate to a general academic readership.
2. Please adhere to page (or word number) limits and please use a standard font type and size wherever and whenever possible.
3. Please offer a clear account of the role to be played by personnel for whom salary is requested, be it technical or postdoc. In the case of postdoc, the role should be substantial with respect to the intent of the program and not simply the task of organizing symposia, etc. And please include a budget justification.
4. Please remember that funding can be awarded only for a single year at a time.

If you are applying for support for a fellowship*, a research or support staff member*, or research expenses, please complete this section.

A. Technical Description (no more than 300 words)
Please provide a succinct description of the problem, background theory, relevant hypotheses and planned methods.

Most efforts to use texts to explore the historical changes in psychology have used English, stretching back at most a century or two (see e.g., Charlesworth 2021, Gelfand 2011). Here we for the first time use vast Latin corpora with impressive spatiotemporal coverage to do historical psychology, which we carry out by testing two claims. The first (longstanding) claim is that guilt is relatively insignificant in the context of shame cultures. The second (very recent) claim is that only indignation and guilt can be rigorously characterized as moral emotions. Applying text analysis methods pioneered in the field of historical psychology, we will use weakly supervised Natural Language Processing (NLP) to probe both assertions.

Our primary hypothesis is that using NLP to induce emotion/embodiment lexicons from surviving historical texts will offer insight into the psychological traits that afforded guilt its central place in Western culture. We base this hypothesis on three growing bodies of evidence. The first suggests that many aspects of psychology have evolved culturally over time. The second suggests that NLP methods can be adapted to extract psychological information from large-scale historical corpora. The third suggests that the physical mechanisms of the cognitive system are involved in the gathering, processing, storing, accessing and communicating of information, and therefore the body not only plays a central role in cognition, but also functions as a sort of "living memory pad" for moral values that shapes the way users use language.

We use weak supervision as our approach to machine learning because it minimizes expert biases and can create larger training sets much more quickly than could otherwise be produced by manual supervision (i.e., labeling examples by hand). Whether our embodiment hypothesis is confirmed or refuted by our test of the above-stated claims, we will add to the discussion around guilt vs. shame cultures and advance understanding of the affective

dimensions of guilt in the Roman context, which will be essential to future diachronic and cross-cultural studies in a range of disciplines concerned with human psychology and its diversity.

B. Non-Technical Description (no more than 300 words)
Using non-technical terms, please describe the set of questions that your project aims to address and the methods you will use to answer them. Describe how this work fits with the mandates of MBB, focusing especially on its interdisciplinary nature.

This project addresses questions that pertain to the variable importance of guilt across societies and how researchers might identify the cognitive systems that contributed to the experience of guilt in historical populations. In pursuit of answers to these questions, we use digital tools to extract features of guilt from the foundational texts of Western culture and observe the psychological traits that afforded guilt its central place in later Western societies.

This research brings together two faculties that rarely, if ever, unite in research, despite each having an interest in human behavior and mental life. The pioneering work of Joseph Henrich in the field of historical psychology has created this opportunity for expert scholars of Graeco-Latin literature and culture to collaborate with experts in evolutionary science to better understand ancient psychologies, how they evolved over time, and in what ways they differ from more modern populations.

The postdoctoral researcher associated with this grant application is uniquely qualified to spearhead this research. She holds a Ph.D. in Classics, is an internationally recognized expert on cognitive approaches to Greek and Roman culture, and will be presenting, with her team, the results of comparable Latin experiments at interdisciplinary conferences at Oxford University and Cambridge University in May 2023. She will also enjoy the support of Prof. Henrich's Culture, Cognition, and Coevolution Lab, which includes data scientists (see Dexter et al. 2017), linguists (see Blasi et al 2022), and psychologists (see Kroupin & Carey 2022).

C. Detailed Project Description
Please include a more detailed description of your proposed project (approximately 3 to 5 pages), including background, aims and hypotheses, methods, data collection and analysis (where appropriate), any preliminary or anticipated results, how this research is relevant to MBB, and any other information that you would like the review committee to consider.

SUMMARY OF PROPOSAL
A large body of work has highlighted the importance of emotional processes in moral cognition, and a heterogeneous bundle of emotions as varied as anger, guilt, shame, contempt, empathy, gratitude, and disgust have been proposed to play an essential role in moral psychology (see e.g., Hutcherson & Gross, 2011; Tangney et al., 2007; Fessler & Haley, 2003; Haidt, 2003; Rozin et al., 1999). However, the inclusion of these emotions in the moral domain often "lacks a clear functional rationale, generating conflations between merely social and properly moral emotions" (Fitouchi et al. 2022). Hence, based on evolutionary theories of morality as an adaptation for attracting others' cooperative investments, it has been proposed that only indignation and guilt

can be rigorously characterized as moral emotions (Fitouchi et al. 2022). We find this a particularly appealing case to test in historical contexts, both because it affords the opportunity to interrogate the prevailing scholarly opinion that guilt is relatively insignificant in the context of shame cultures, like those of ancient Greece and Rome (Jaeger 1933, Benedict 1946, Sorabji 2014, Konstan 2016, Cairns 2020), and because it will offer insight into the psychological traits that afforded guilt its central place in Western culture.

We will test Fitouchi et al.'s Guilt – Indignation hypothesis by using the methods of historical psychology (Muthukrishna et al. 2020, Atari & Henrich 2023). Specifically, we will use weakly supervised Natural Language Processing (NLP) to induce embodiment-focused emotional lexicons and quantify expressions of guilt and indignation during the Roman period. We focus on classical Latin because we are interested in identifying guilt as an evolving affective phenomenon in the West, such that it can be compared cross-culturally on both a synchronic and diachronic basis. We take an embodied approach because the physical mechanisms of the cognitive system are involved in the gathering, processing, storing, and accessing of information, and therefore the body not only plays a central role in cognition (see e.g., Barrett 2017) but also functions as a sort of "living memory pad" for moral values (see Piaget 1970 & Lizardo 2004). We apply this approach to text analysis because language is shaped by the body and the bodily dimensions of language are available to study (see e.g., Lakoff & Johnson 1980, Gallese & Lakoff 2005, Fischer & Zwaan 2008, Johnson 2015). We use weak supervision (explained below) as our approach to machine learning because it minimizes expert biases and can create larger training sets much more quickly than could otherwise be produced by manual supervision (i.e., labeling examples by hand).

PREPAREDNESS
There is an existing computational infrastructure comprising both textual corpora and analytical tools, as well as a well-developed interdisciplinary collaboration that will support the proposed research. Members of the project team have substantial relevant technical expertise. Joseph Henrich, who is pioneering the field of historical psychology (2021, 2023), has contributed groundbreaking research in the evolution of social learning and conformist transmission (1998), the forces that shape differences in cultural psychologies across space and time (2021), and the roots of human morality (2008, 2018, 2022). This body of research suggests that guilt is likely an adaptive response that ensures cooperative, prosocial behavior. Analyzing classical Latin literature in terms of its cooperative and prosocial features is the ongoing work of Jennifer Devereaux, who is an internationally recognized expert on cognitive approaches to Greek and Roman culture. She has edited *The Routledge Handbook of Classics and Cognitive Theory* (2019) and has published work on embodiment in Latin semantics (2016), the role of embodied language in the art of persuasion (2019), and the body as mnemonic device (2018). Forthcoming is also work on identifying emotive memory traces in Roman literature (2023) and identifying how such traces evolve and adapt to new contexts -- in this case, Meiji Japan (2023/4). She has presented her work across the globe, including research on guilt and homophily in Roman philosophy and culture, and she has written reviews for the top journals in her field (see CV).

The computational needs of the project will be supported by the Quantitative Criticism Lab (QCL), which has made substantial contributions to Latin NLP research over the past decade. Important advances include training word2vec models on lemmatized Latin corpora that achieved state-of-the-art performance in 2021 for two standard evaluation tasks (synonym matching and analogy completion; Burns et al. 2021), and development of Latin BERT, the first contextual language model for Latin (Bamman and Burns 2020). QCL will make use of a large diachronic corpus of digitized Latin texts. All material in our corpus is freely and publicly available; it is drawn from a variety of sources, including the pioneering Perseus Digital Library and Tesserae Project for classical material and the Latin Text Archive, directed by our collaborator Bernhard Jussen, for post-classical material. In previous work, QCL has used the Perseus/Tesserae corpus for computational studies of the evolution of Latin literary style (Dexter *et al.* 2017, Chaudhuri *et al.* 2019). To our knowledge, this is among the largest repositories of analysis-ready Latin texts in the world. Much of the corpus has been tagged with metadata about date of composition and author place of birth; the remaining annotation work is expected to be completed prior to the start of the grant period. To work with this corpus, QCL has created ITER (Integrated Text Experiment Repository), which is designed to provide an efficient means for feature analysis as applied to a large, heterogeneous collection of Latin documents through a corpus-reader architecture and a flexible text-processing pipeline. Developed primarily by our collaborator Patrick Burns, ITER breaks texts down into smaller units of analysis (e.g., sentences, words, or characters) with related annotations (e.g., lemmas or part-of-speech tags) that can be used as input for building language models, generating text visualizations, and related computational tasks, all of which are essential for the study of psychological concepts in Latin texts.
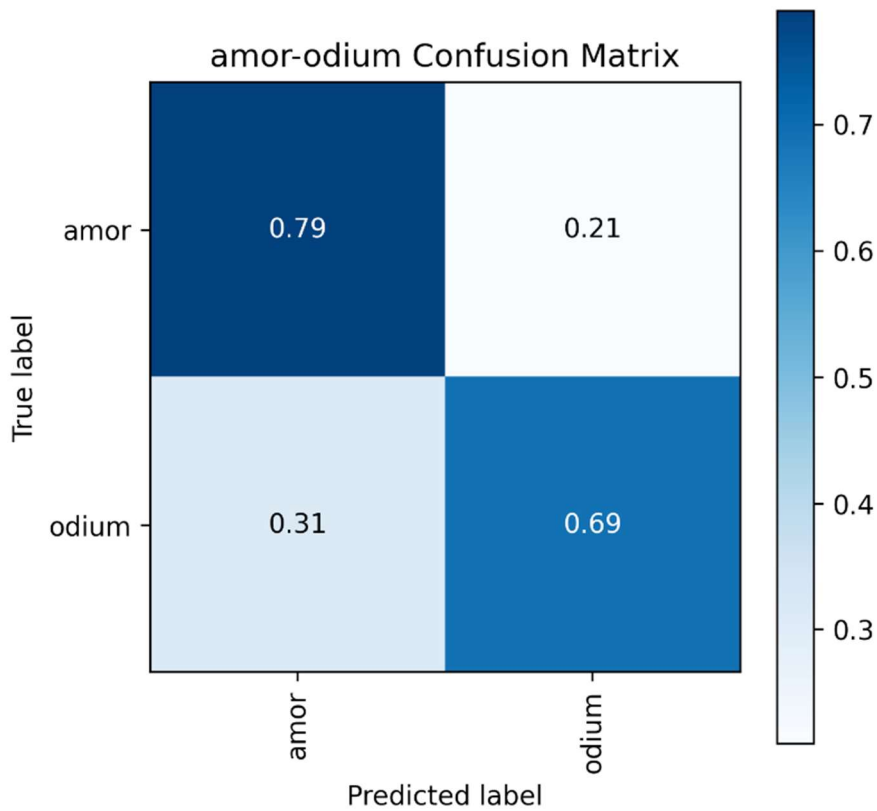
AIMS, OUTCOMES, AND FUTURE DIRECTIONS

Our first aim, which is already underway (see preliminary data below), is to develop NLP methods for inducing emotion/embodiment lexicons using weakly supervised learning. We will begin by extracting two collections of Latin sentences from our corpus of extant texts that are labeled (e.g.) "culpa" (guilt) because they contain the word culpa and "indignatio" (indignation) because they contain the word indignatio. We will then train a shallow neural network as a classifier to predict whether each sentence contains "guilt" (culpa) or "indignation" (indignatio) based on the feature importance of all the other words in the sentence. Inspection of the feature rankings will yield an emotion lexicon for culpa-indignatio, with the weights of the classifier telling us about lexical associations with guilt and indignation. This method is specifically useful for historical-text application because it distributes identification over a large number of lexical features and thereby obviates the need for building lists of relevant words, which would require determining the "relevance" for each term included. It also has the additional—and in the case of Latin, not insignificant -- benefit of assigning feature importance to words that we know from the secondary literature are likely to contribute to emotion identification but may be unlikely to be included on existing lists of emotion-specific keywords, (e.g., metaphors like *astringo* for "feel guilty"). These methods are flexible and can be adapted to enable diachronic and cross-cultural

studies involving multiple languages; to promote uptake of our approach, we plan to make the Latin lexicons, as well as all associated code, publicly available.

Through the development of the lexicon, we will test the idea that guilt is relatively insignificant in the context of shame cultures and will learn about the traits (individualism, loyalty, etc.) that are coextensive with guilt in ancient Roman culture and how these change over time. Based on prior philological research, we hypothesize that we will observe the mapping of bodily dispositions related to avoidance impulses and fear onto guilt, as well as bodily dispositions related to approach impulses and anger mapping onto indignation across the corpus. Furthermore, we hypothesize that there will be a statistically relevant correlation between such mappings and language associated with the Care/Harm dimension of Moral Foundations Theory (MFT). MFT is a social intuitionist model of moral cognition which hypothesizes that moral judgment is primarily the result of quick, automatic evaluations (Haidt, 2001), and proposes that several innate and universally available psychological systems are the foundations of "intuitive ethics" (Haidt & Joseph 2007). Although MFT has six dimensions, we are focusing on Care/Harm because it is the only MFT dimension that was also explicitly identified as moral in the ancient Mediterranean (Gorg. D53; Plat. *Rep*. 334e). Whether these hypotheses are confirmed or refuted by our test of Fitouchi et al., we will advance understanding of the affective dimensions of guilt in Roman culture, which will be essential to future diachronic and cross-cultural studies in a range of disciplines. The target venue for publishing this work is *Emotion Review*. Then, working with Mohammad Atari (see Atari et al. 2020, Atari & Henrich 2023) to extract measures for all dimensions of MFT, we will leverage the same computational methods to examine the other moral foundations proposed by MFT, further broadening our understanding of affect and cultural variations of emotion and morality across time and space (target venue: *PNAS* or another science journal with broad interdisciplinary scope).
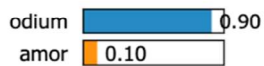

PRELIMINARY DATA

We have completed some preliminary work necessary to carry out the work proposed here and presented that work at the brand-new pre-conference for historical psychology at the 2023 annual meeting of the *Society for Personality and Social Psychology*. As a test case, we applied our weakly supervised approach to induce a sentiment lexicon for amor (love) and odium (hate). The input layer was a domain-specific embeddings layer, followed by a bidirectional LSTM layer, a dropout layer, and finally an output layer, which uses a sigmoid activation function to return a class probability. The model used Adam as the optimizer and binary cross-entropy as the loss function. The model was trained for 20 epochs with a batch size of 64, using a learning rate of 1e-5. The results of our preliminary investigations were encouraging. Brady, McLoughlin, and Crockett (2021) note (via Barnes, Klinger, and Walde (2017)) that state-of-the-art sentiment classifications scores fall in the range 60-80%. Our model lands squarely within these bounds. The early training results on the love/hate classification task will be published in *Studies in Cognitive Classical Semantics: Metaphor, Emotion, Embodiment* (2023/4).

amor-odium Confusion Matrix


```
Intercept 0.6120970298892118
Prediction_local [0.09126484]
Right: 0.09842151
```
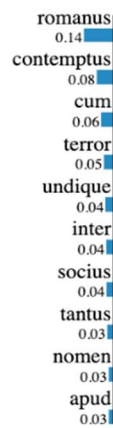
original: cum tanti undique terrores circumstarent appareretque omnibus non odio solum apud hostis sed contemptu etiam inter socios nomen Romanum laborare ,
source: livy.ab_urbe_condita.part.1.books_1-10.pickle

Prediction probabilities

odium	0.90
amor	0.10

odium **amor**

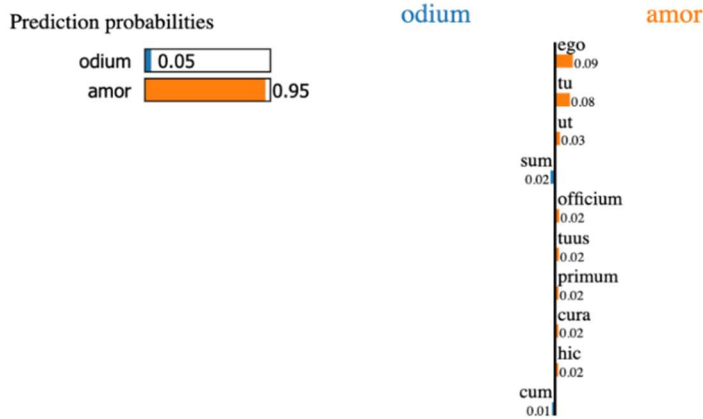|	
romanus	0.14
contemptus	0.08
cum	0.06
terror	0.05
undique	0.04
inter	0.04
socius	0.04
tantus	0.03
nomen	0.03
apud	0.03

Text with highlighted words

cum tantus undique terror circumstao appareretque omnis non *** solum apud *** sed contemptus etiam inter socius nomen romanus laboro

```
Intercept 0.7378079448053165
Prediction_local [0.98349543]
Right: 0.95068944
```

```
original: hoc tuum officium cum mihi gratissimum esse dicam , sequitur illud , ut te existimare velim mihi magnae
curae fore atque esse iam , primum ut ipse tu tuique omnes , deinde ut etiam reliqui scire possint me tibi esse
amicissimum .
source: cicero.epistulae_ad_familiares.part.3.ad_claudium_pulchrum.pickle
```

odium   amor

Prediction probabilities

odium	0.05
amor	0.95

ego 0.09
tu 0.08
ut 0.03
sum 0.02
officium 0.02
tuus 0.02
primum 0.02
cura 0.02
hic 0.02
cum 0.01

Text with highlighted words

hic tuus officium cum ego gratus sum dico sequor ille ut tu existimo uolo ego magnus cura sum atque sum iam primum ut ipse tu tuique omnis deinde ut etiam reliquus scio possum ego tu sum ***

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* If you are applying for support for a fellowship, please also complete this section.

Fellowship Candidate Information
Name:
Email address:
Degree: Degree date:
Current advisor:
Identify support the candidate is applying for that would run concurrently with the period covered by this application (type, source, amount, dates):
Identify the candidate's other potential funding sources for this project:
Please include the candidate's CV with this application packet.

If you are applying for support for developing and launching a workshop, conference, seminar, symposia, course, or other non-experimental project, please provide the following:

A. **Introductory summary/hypothesis**
B. **Background information, including any preliminary work for this project**
C. **Significance, expectations, possibilities, alternative perspectives**
   Please discuss a projection of themes likely to arise from the effort that will be carried forward jointly within the two or more disciplines. When possible, comment on whether a potential cadre of interested faculty or students has been identified, whether the subject or topic matter is substantially mature with cogent texts/sources already available, and whether a set of likely and plausible speakers have been identified/approached.
D. **Statement of relevance for MBB (Why MBB should support the project)**
E. **Progress report if this is a request for a second year of funding**

Application Packet Checklist
X   Application form
X   A budget (next page)
X   Applicable supporting documents

Please email a single pdf version of this application packet to HarvardMBB@gmail.com by March 20, 2023.

Mind Brain Behavior Interfaculty Initiative Faculty Award
2023-2024 BUDGET PAGE
PI(s): Prof. Joseph Henrich & Prof. David Elmer
Project Title: Researching Morality: Methods from Historical Psychology

Expense Category	Budget Amount	Description
Personnel	**50K**	**Postdoctoral Fellow**
Other services		
Supplies & Equipment		
Human or animal subject fees		
Printing/postage		
Travel:		
Workshop or Conference Expenses		
Other:		
Budget Total	**50K**	