

What Everyone Says : Public Perceptions of the Humanities in the Media

*Alan Liu, Abigail Droge, Scott Kleinman,
Lindsay Thomas, Dan C. Baciu & Jeremy Douglass*

Using computational means to understand patterns in how the humanities are mentioned in U.S. journalism, the WhatEvery1Says project brings into focus challenging problems in the perception of the humanities. This essay reports on the project's findings and some of the further questions that emerged from them. For example, how does the "humanities crisis" appear among the many crises of our time? Why do the humanities figure so often in connection with concrete, ordinary life yet also seem abstract in value? How can more of the substance of humanistic research be communicated as opposed to appearing as just academic business? And why is there so little focus in the media on how underrepresented populations are positioned in relation to the humanities by comparison to science and social, political, or economic issues? The essay concludes by recommending that the humanities reframe their crisis as part of larger human crises requiring multidisciplinary "grand challenge" approaches.

They say the humanities are in crisis. Society values the sciences and engineering more; students turn to other majors; humanities programs are the first to be cut in recessions; and funding support for the humanities continues to be a national budget rounding error.¹ This picture does not improve when the humanities are considered over centuries. As Paul Reitter and Chad Wellmon argue in *Permanent Crisis: The Humanities in a Disenchanted Age*, the humanities have been in crisis throughout modernity because they staked their values in opposition to those of capitalistic, industrial society:

The story of the *Geisteswissenschaften* [or "the modern humanities"] as narrated by their advocates from Dilthey's day to ours has consistently been one of crisis and decline in which capitalism, industrialization, technology, and the sciences eroded the humanities' cultural legitimacy and epistemic authority.²

Whenever the coin of modern industrial society landed face up, the humanities were in crisis; and whenever face down (as in recessions), they were doubly in crisis.

Yet in 2019, when the American Academy's Humanities Indicators surveyed Americans' views of the humanities, the top takeaway was that there was "considerable agreement about the personal and societal benefits of the humanities, substantial engagement with a variety of humanities activities at home and in the workplace, and strong support for teaching humanities subjects in the schools." Also, "relatively few Americans agree with a variety of negative statements about the field."³

So what *does* everyone say about the humanities? In 2013, after the Great Recession, our 4Humanities.org initiative, which pursues humanities advocacy using digital means, started the WhatEvery1Says project (WE1S) to answer this question.⁴ Funded from 2017 to 2021 by a \$1.1 million grant from the Mellon Foundation's Public Knowledge program (formerly called Scholarly Communications), the project explored public perception of the humanities through methods complementing, but mainly differing from, the Humanities Indicators' surveying approach.⁵ We read the media. In particular, we used databases (primarily Lexis-Nexis) and other online sources to gather a corpus of 1,028,629 English-language, journalistic media documents mentioning the word "humanities" and, for some research purposes, also the terms "liberal arts," "the arts" (in the British sense spanning humanities and arts), and "science(s)." This corpus, which we organized in collection subsets (such as our C-1 collection of U.S. mainstream, local, and student newspaper articles), draws on 1,053 U.S. and 437 international news and other sources from the 1980s through 2019, though mostly after 2000. For comparison, we also gathered a random sample of 1.38 million documents from those sources. In addition, we harvested over six million social media posts mentioning the "humanities" and related terms (about five million from Twitter and one million from Reddit), and about 1.2 million transcripts of U.S. television news broadcasts from those available in the Internet Archive.⁶

Why search for the word "humanities" and related keywords? These terms by themselves do not cast a net over all the humanities. In the vast sea of public discourse, the humanities also appear under the names of "literature," "history," or other specific fields and are evoked everywhere in discussions of particular people, books, organizations, or events. There is no predefined, bounded set of media documents for studying public discussion of humanities topics. So we aimed for a strategically chosen subset of journalistic materials mentioning the literal word "humanities" in order to capture a swath of examples on both sides of the line between a general concept and specific kinds of humanities, and between wider public discussion (as when "humanities" comes up in relation to broadly literary or historical areas) and specialized academic discourse on the humanities.

Focusing our analysis for the present on U.S. sources, we pursued research questions with the aid of a computational machine learning method called "topic modeling," complemented by other algorithmic methods such as text classifica-

tion, keyphrase extraction, statistical detection of words distinctive to groups of texts (using the Wilcoxon rank sum test), and simple counting (such as how often “humanities” comes up by comparison with “science[s]”). Widely utilized in the sciences, social sciences, and digital humanities, topic modeling assists humans in understanding large collections of texts by discovering what appear to be thematically coherent “topics.” It does so by analyzing which words tend to co-occur across a corpus and in individual texts. In a topic model, co-occurring words are assembled into groups and ranked by prominence within that group. When articles contain many words from such a group (to take an example, words like “London” and “Parliament”), this can suggest that they participate in the topic behind that group (here, perhaps, “British government”). Topic models also separate out different topics even if they share words, as would be the case in articles discussing “London” in an overlapping vocabulary of economics, referring to the city’s status as a finance capital. Further aiding in grasping large corpora, topic models indicate the relative weights of topics in the whole document set as well as in individual texts (which are infused with multiple topics in different proportions), and additionally identify specific documents highly associated with topics of interest, thus guiding researchers to particular texts to read closely.⁷

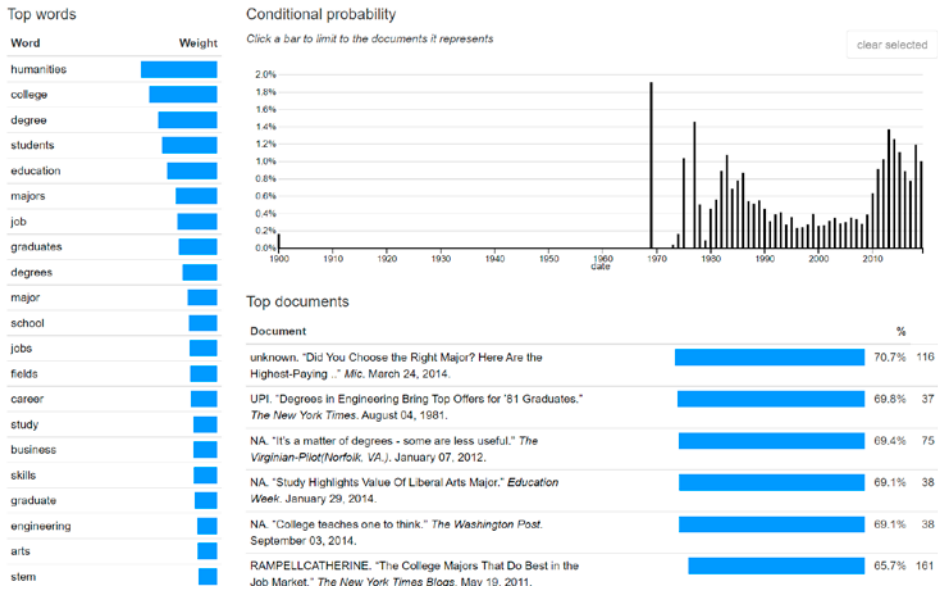
So what did we find? Initially, we drew up findings on our website in one-page, modular, plain-language “key finding cards” inspired by data-reporting methods in the nutrition, medical, and data science fields.⁸ Drawing on those cards, and connecting and amplifying their themes, we here put forward broader claims. Below are our most important larger findings, which in our conclusion we frame in an overarching argument: the challenges posed by public perception of the humanities are an opportunity to reposition the humanities in relation to the largest crises – the “grand challenges” – of our time.

An important initial context for understanding the profile of the humanities in the media is that their public mindshare is very small. In a random sample from top U.S. newspapers, 2 percent of articles mention the humanities. By comparison, 7 percent mention the sciences.⁹ The “humanities crisis,” a frame that academic humanists often feel is all-consuming, is not a crisis in the awareness of larger society (though it does receive some attention in college journalism).¹⁰ Even within the comparatively few discussions of the humanities in the media, crisis is by no means the predominant frame. Instead, such discussions encompass a wide set of associations – even mundane ones that would not individually seem to be worth mentioning – that destabilize our preconceived definitions of what the term humanities means.

Our corpus shows, for example, that the humanities are threaded throughout people’s experiences as part of the ordinary happenings of life.¹¹ Embedded in the everyday, event-oriented, and local, the humanities participate in a constant

Figure 1
Topic Model of WE1S Collection 1 Shown in Andrew Goldstone's Dfr-Browser (adapted for WE1S)

Topic 25

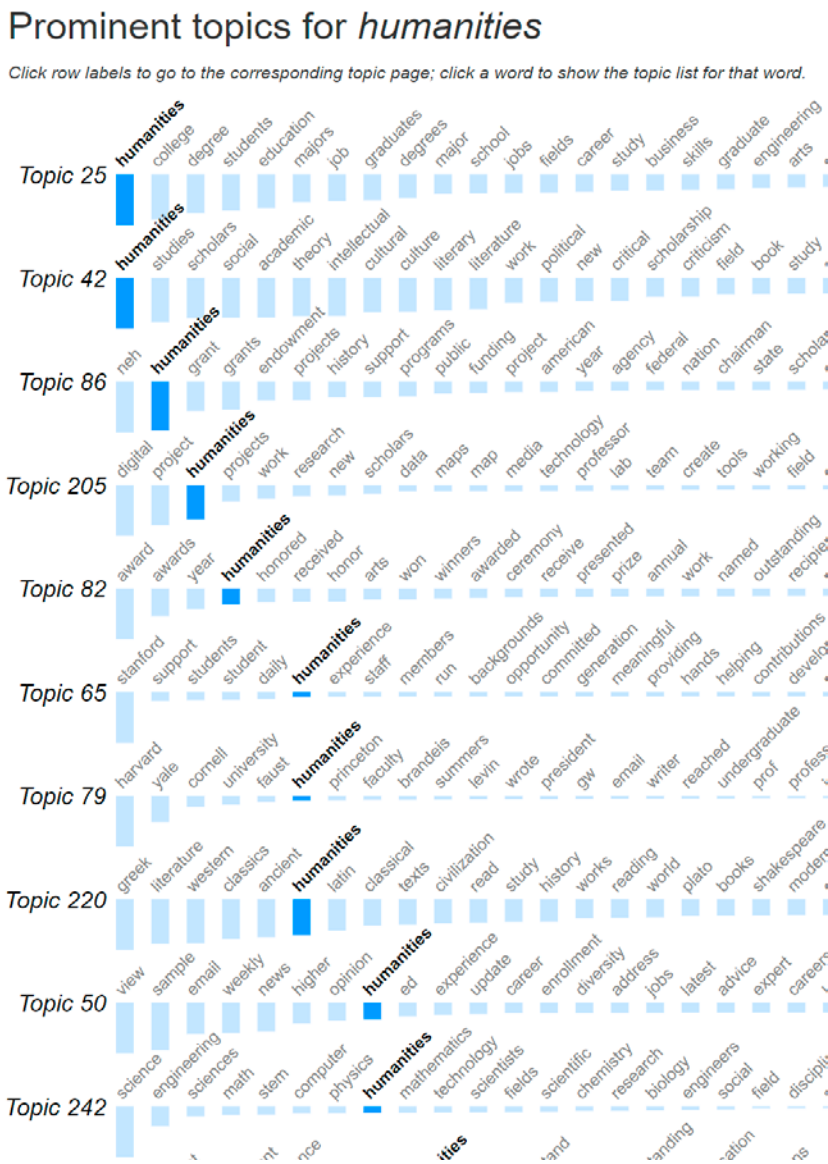


Collection 1: U.S. News Media, c. 1989-2019 (WE1S core collection of articles mentio

Overview Topic Document Word Bibliography Word index



Figure 1, continued



Downloaded from http://direct.mit.edu/daed/article-pdf/15/1/3/192060702daed_a_01926.pdf by guest on 07 June 2023

Note: Separate views show part of a grid of 250 topics, the top topics in which the word “humanities” frequently appears, and a detailed look at Topic 25, displaying the most frequent words in the topic and documents highly associated with those words. For live examples of visualizations shown in Figures 1 and 2 and other topic model visualization tools, see the “start page” of Collection 1 at “Collection 1: U.S. News Media, c. 1989–2019,” WhatEvery1Says, http://harbor.english.ucsb.edu:10002/collections/20190620_2238_us-humanities-all-no-reddit/.

stream of cultural activity and community gatherings, appearing in discourse about local arts festivals, bookstore readings, museum exhibits, and campus events.¹² Similarly, on Twitter, students mainly use the term humanities to chronicle everyday moments on campus, such as attending a class, taking an exam, or noting an event in the humanities building.¹³

The humanities also index the “ordinary” in the different sense of fundamental events of living and dying. Wilcoxon test and keyphrase extraction data show that articles containing “humanities” from top-circulation newspapers, for example, are characterized in part by family-oriented language such as “wife,” “mother,” “father,” “son,” “daughter,” “children,” and “parents” as well as life-event verbs such as “born,” “married,” and “died,” often indicating the frequency of obituaries and wedding announcements.¹⁴ Mentions of the humanities disproportionately accompany such genres representing momentous personal occasions when families for reasons of their own find it important that a loved one’s life be crowned by citing a humanities degree, award, or organization. Notably, this kind of everydayness appears to be more pronounced for the humanities than for the sciences. While we found in our corpus that documents mentioning the sciences far outnumber those mentioning the humanities (by a ratio of about twenty-five to one), the numbers of obituaries mentioning the sciences and the humanities are relatively even.¹⁵ This finding suggests just how widely humanities-related organizations and activities are deposited throughout the social body. Genres that are often overlooked in discussions of the humanities – event listings, marriage announcements, and obituaries – became central for us as a previously unrecognized milieu of the powerful, widely distributed impact of the humanities.

Another main context for the humanities in the media is higher education. Words like “students,” “faculty,” “dean,” “courses,” “major,” and “departments” frequently co-occur with “humanities,” indicating how deeply the humanities are tethered to academia, particularly college teaching. Higher education is a dominant discursive frame in Twitter posts mentioning “humanities” as well.¹⁶ Across our collections, the media not only depicts the humanities as siloed in universities but also sees few distinctions between its academic fields.¹⁷ Whereas individual scientific disciplines are often clearly delineated, humanities fields tend to blur together as generic “academics.”¹⁸ Screened behind a dense mass of institutional arrangements and infrastructure, even prominent humanities disciplines are often illegible.¹⁹ Other humanities fields fade entirely out of view.²⁰

The way the humanities appear in higher education varies by institution, however. When we compare articles from a variety of university and college student newspapers using Wilcoxon tests, we see differences between private and public institutions.²¹ Articles associated with private institutions often emphasize the language of student experience, growth, and exploration, along with big questions

of human meaning marked by terms like “experience,” “develop,” “explore,” “practice,” “personal,” “interest,” “idea,” “unique,” “opportunity,” “intellectual,” “understand,” and “question.”²² We also see this phenomenon in subsets of private institution newspapers, including at women’s colleges (“thinking” is characteristic), religious schools (big-question words like “justice” are common), and liberal arts schools (words such as “experience” and “feel” are prominent).²³ Articles in the newspapers of public institutions, by contrast, are broadly characterized by organizational and infrastructural language such as “state,” “campus,” and “building.”²⁴ Newspapers at Hispanic-serving institutions and those at community colleges similarly favor language related to academic structures and infrastructure, such as “student,” “president,” “campus,” “instructor,” and “transfer.”²⁵ Perhaps most illuminating, the word “humanities” itself is more distinctive to sources from private institutions, doctoral universities, and religious colleges, suggesting that the term indexes a topography of prestige and resources.

The above contexts – everyday public life and academic infrastructure – represent two major frames through which media coverage refracts the humanities. What is *missing*, however, is just as important. One crucial absence we believe we have found lies in coverage of the humanities as they relate to underrepresented racial, ethnic, gender, and sexual identity groups. We see relatively little attention in the media to how people of color, women, or members of the LGBTQ+ community are positioned by (or position themselves in relation to) the humanities, at least as a focused area, approach, or set of institutional structures and infrastructures. We have not found many answers in the media at scale for questions such as, “How are different gender and ethnic groups positioned in relation to the humanities in public discourse?” and “What kind of conversations do these groups hold about the humanities?”²⁶ This differs from media discourse on the sciences, in which, for instance, many articles discuss involving more girls and women in STEM.²⁷ The media, and the public it informs, seem oblivious to the humanities as an important context in which to situate underrepresented social groups. Attention is focused instead on such groups in relation to the sciences or broader social, political, and economic contexts, creating an omission in public discourse that is all the more striking given that the humanities have been at the forefront of much research and teaching about race, ethnicity, gender, sexuality, and related concepts.²⁸ This is a crucial omission that we think should be tested further by gathering additional corpus materials to overcome some of the limitations we encountered using proprietary databases of news sources to analyze media related to specific communities.²⁹

Another significant absence in media representations of the humanities is what we might call colloquially the actual “stuff” of the humanities: the materials, contents, and outputs of humanistic endeavors. Straightforward reporting on the objects and outcomes of humanities research, for example, is notably missing

in our corpus. By contrast, articles about scientific research often rivet the public's attention on actual *things* observed or discovered, like exoplanets, particle accelerators, or genes.³⁰ With the exception of books, the humanities are exceptionally object-poor in the media. Analysis of key phrases in top-circulation newspapers and student newspapers, for example, yields an impression of a contentless humanities. Names of literary figures, historical events, or fine-grained subjects of humanistic study are not mentioned with sufficient frequency to become embedded in readers' consciousness as humanities "stuff" (though arts events, such as painting exhibitions, musical performances, and, above all, theatrical productions, do appear frequently).³¹ When the stuff of the humanities is mentioned, it is often at one remove in coverage of its communicative activities, such as talks, classes, discussions, panels, and festivals. Whereas scientific findings are announced in articles that start, "Researchers find . . ." or "Studies show . . .," humanities stuff travels under the cover of its packaging in a venue or calendar event ("Professor to give talk . . .").³²

Even overt defenses of the humanities in the media lack explicit objects and outputs. Justifications for the humanities as contributing to the "public good" or providing "job skills" tend to be unmoored from specifics.³³ Commentators argue that the humanities are central to citizenship, for example, but rarely offer tangible descriptions of the mechanics of that citizenship involving the humanities in political process, intervention, commentary, or democratic engagement.³⁴ Science debates, in contrast, often convey specific political or legal contexts and refer explicitly to laws, bills, hearings, policies, court cases, and presidential agendas, giving a clearer sense of the public forums and avenues for civic action linked to scientific questions.³⁵ Or consider job-oriented justifications for the humanities that emphasize flexibility in skills and careers. "History majors do . . . everything," for example, and humanities skills "can be applied to many different occupations" and "keep open as many employment options as possible."³⁶ Such justifications assert the broad relevance of a humanities education but do little to provide students with a clear idea of the day-to-day practicalities of applying the content or methods of humanistic study to jobs. In writings that defend the humanities, platitudes stand in for precision.

In short, media representations of the humanities diverge toward the extremes of the minutely specific, grounded in announcements of events and venues, and the unspecified, floating free from individuals and their communities into generalities. This suggests that the humanities struggle to be perceived as capable of bridging scales, of zooming in to the individual human scale while also zooming out to the societal scale. How the humanities help people move step by step from the minute experience of reading a book or attending a class, for example, to larger social and world action, and then back again in a round-trip of local-global engagement is not at all obvious. Genre conventions in the media increase the dif-

faculty of traversing from the small to big humanities, from “the book I love” to “the issues we care about.” We see in our corpus that discussions of the humanities span between media genres anchored in the local and particular – the obituary, event announcement, review, course listing, college news bulletin, or tweet about a class – and genres aimed at sweeping claims, such as op-ed defenses of the humanities. But there is no obvious genre conducive to mixing those scales: that is, not a “sidebar” or “color story” on the humanities but a kind of societal advice column on how to take concrete instances of humanities engagement at the individual level and apply them to large-scale social and other problems.

These findings help us imagine repositioning the humanities in society, activating problems in their media perception to goad not just an image change but core changes in what the humanities actually *do* that could earn an image makeover. We close by advancing this goal of reimagining through the overarching argument foreshadowed earlier about how the humanities can engage the “grand challenges” of our time.

Consider that while the humanities are often pictured by its stakeholders to be hanging on through serial crises – recently, the Great Recession and the COVID-19 recession – they are not unique in this regard. Responding to the same Great and COVID recessions, respectively, the Obama and Biden presidential administrations painted a scene of national crisis in some of their signature policy initiatives, including a crisis in the legitimacy of government itself. Alluding to the latter, which is like a crisis within a crisis, the Obama White House’s 2009 “A Strategy for American Innovation: Driving Towards Sustainable Growth and Quality Jobs” asked if “the recent crisis [the Great Recession] was the result of too much rather than too little government support,” and answered that it “illustrates that the free market itself does not promote the long-term benefit of society.”³⁷ And the Biden White House’s 2021 “Fact Sheet: The American Jobs Plan,” which declared a multitrillion dollar infrastructure proposal, specified a litany of crises – the “climate crisis” (mentioned four times), “western drought crisis,” “affordable housing crisis,” “caregiving crisis,” and “economic crisis” – to argue for “infrastructure investments across all levels of government.”³⁸

In our context, we can say that Obama and Biden made a metaphorical “humanities” out of the “government,” portraying government, like the humanities, as a kind of tragic hero agonistes. Both suffer the slings and arrows of outrageous fortune. Their crisis is to be, or not to be.

But there is an important difference between the two portrayals of crisis. The humanities appear as passive victims. But the presidents strategically reframe crisis to assert that government is necessary to meet it. That new frame is the idea of “challenges,” and especially grand challenges. The Obama White House’s “A Strategy for American Innovation” ends with a climactic recommendation to

“Harness Science and Technology to Address the ‘Grand Challenges’ of the 21st Century.” In similar language, the Biden policy statement declares, “Like great projects of the past, the President’s plan will unify and mobilize the country to meet the great challenges of our time.”

Originally modeled on the mathematician David Hilbert’s declaration in 1900 of twenty-three unsolved mathematical challenges, the grand challenges paradigm – a kind of transcendental to-do list – has become a commonplace policy instrument in governmental, national academy, professional association, philanthropic, higher education, and other domains. Some examples are the grand challenge goals and/or grants declared for the United States or the world by the Bill and Melinda Gates Foundation (starting with its “Grand Challenges in Global Health”); the U.S. Defense Advanced Research Projects Agency (DARPA); the U.S. National Academy of Engineering; the U.S. Department of Energy; and the American Academy of Social Work and Social Welfare. University-led grand challenges followed apace.³⁹

A grand challenge is a crisis under another name. It recognizes calamity yet envisions concerted actions in response. Grand challenge initiatives confront crises of national or global proportions that have no discrete or near-term solution and require collaborative, interdisciplinary solutions on multiple fronts: scientific, engineering, biomedical, agricultural, social, economic, cultural, ethical, and educational. World energy, world climate, world hunger and thirst, and world disease are examples. The purpose of defining grand challenges is to marshal expertise and resources to address such crises.

The grand challenge paradigm is open to criticism, including lack of systemic holism (it is listicles all the way down), outsize emphasis on STEM fields, deterministic solutionism, displacement of any historical or other inquiry not strictly instrumental, and others.⁴⁰ Still, there is one advantage of a grand challenge narrative over a crisis one that should be striking for those concerned about the “humanities crisis.” Whatever the STEM bias of grand challenges, every single one requires at some point serious engagement with the humanities – with history, culture, language, and ethics – as cause, effect, or both. For instance, any grand challenge affecting, or affected by, population migration at scale (which may be all grand challenges) is ipso facto also a humanistic challenge because of the entailments of history, culture, language, and ethics. Heidi Bostic argues for the necessary participation of the humanities in grand challenges in an opinion piece published in *The Chronicle of Higher Education*:

Scientists and engineers remind us again and again that these matters [grand challenges] must be understood within broader realms of human concern, like health, vulnerability, sustainability, and the joy of living. These are basic issues of meaning, purpose, and value, questions that the humanities confront. We can thus see underlying

all of the other grand challenges the fundamental questions at the heart of humanistic inquiry: Who are we and how ought we to live? And so the humanities also reveal additional grand challenges overlooked by science, engineering, and technology.⁴¹

In short, there is no humanities crisis as such. Instead, the humanities are enfolded in expressions of, and responses to, larger *human crises*. Can the humanities position themselves in partnership with the sciences and social sciences as part of the full “liberal arts” and “human sciences” needed to address the shared challenges of our time?

In public perception, some aspects of the humanities we have identified in our findings seem remarkably ill-suited to answering this question in the affirmative. However, we also discern promising features and new trends that could be harnessed to articulate the potential alliance of the humanities with the sciences, engineering, medicine, and other areas in approaching society’s challenges. We identify four key aspects of the humanities to build on. The humanities need to practice – and be *seen* to practice – the following: moving between the public and academic spheres; adding particularity to the global; building concrete, material practices into larger conceptual frames of value; and engaging methodologically across disciplines.

First, grand challenges require a humanities able to traverse, and to value equally, the public and academic. We concur with today’s robust initiatives and discussion of the public humanities. But our findings show that the notion of the public humanities runs against the grain of public perception. The media may associate the humanities with many public events and experiences, but it also portrays them as siloed, as we put it, in inscrutable academia. Nevertheless, public and academic spheres overlap in media coverage of what we termed ordinary experiences, events, lectures, literature readings, and so on. That wide river delta of the humanities flooding across everyday individual and social life creates fertile ground on which to build the public humanities.

Second, grand challenges require that the sweeping scope of the “grand” be particularized for specific nations, locales, and communities. The humanities can be pivotal in making that turn to the here-and-now, and me-and-mine. After all, the Gates Foundation’s Global Grand Challenges evolved into a family of initiatives addressed to varied regions: Grand Challenges Africa, Grand Challenges Explorations-Brazil, Grand Challenges India, and so on.⁴² It turns out that grand challenges have no one-size-fits-all solution because they are complicated by the specific lived experiences of different groups. Humanities methods can in principle shine in this regard. A humanistic approach to grand challenges would pursue both civilization-wide and deeply nuanced, local approaches to particular peoples and individuals. However, we also found problems hindering the perception that the humanities can help individuate grand challenges, including a paucity of me-

dia discussion about the relation of the humanities to underrepresented identity communities and disparities in views of the humanities across educational institutions with differing local resources and demographics. Lacunae of this sort underscore the need for the humanities to bridge between the universal and individual scales of grand challenges (zooming in and out, as we said earlier) by more fully applying its rigorous sensitivity to human difference in the public sphere. If the humanities can be seen to be vital in contributing their individuating approach to asking the big questions of grand challenges, then they may also be perceived as crucial in ensuring that the power to ask such questions is not reserved only for a privileged few.

Third, a corollary of requiring grand challenges to be particularized is that universal values (such as global health) need to be infused with concrete, material practices (such as a vaccine that can actually be delivered in Africa). The humanities should participate more fully in such practical thought. Among STEM fields, technology and engineering have been first among equals in grand challenge initiatives because they are applied sciences. By contrast, the humanities are seldom portrayed as applied in this mode, even by advocates defending their value. Justifications that float enormous but empty balloons of value, like “critical thinking” or “flexibility,” are disconnected from the concrete, pragmatic, lived milieu of experience that elsewhere in public discourse radiates from the humanities in event announcements, course listings, wedding notices, and obituaries. In order for the humanities to engage with grand challenges, a chain of linkages from their discrete practices to more general values needs to be established and communicated: for example, first a linkage from a specific poem recited at a funeral to the larger value of the humanities in local communities, then a linkage from community experiences of the humanities to state or national values, and finally a linkage to such grand values as the public good, global health, economic equality, and social equality. Establishing communicable and reproducible practices, conventions, and institutions for moving back and forth in graduated steps between concrete actions and large values can help the humanities join the broader congress of disciplinary practices needed to address world challenges.

Fourth, grand challenges require interdisciplinary exchange not just in research aims but research methods. Humanities methods have room to grow to meet up with those of STEM. Over the course of our project, for example, we gradually came to recognize that our methodology – which mixes humanistic approaches such as close reading with the quantitative, algorithmic, and procedural approaches of the sciences and (in some respects) social sciences – is as central to what our research is about as any finding. It is not crucial whether we call the methods that now overlap in this mixing zone digital humanities, cultural analytics, digital social science, data science, or *in silico* science. What matters is that combining humanistic and scientific methods is one way to revive older notions

of the liberal arts and human sciences in a fresh context that is urgent for society today. Thus consider the research of one of WE1S's former postdoctoral scholars, Dan C. Baciú, whose work blends the humanities with science, mathematics, arts, and digital methods. In "Creativity and Diversification: What Digital Systems Teach," for example, Baciú makes a broad statement about how everything, including culture, is intertwined, creative, and diverse: "any new idea is the product of all past ideas, creativity, and diversification."⁴³ He then translates this proposition word by word into mathematics, which yields an equation (the replicator-mutator equation) that is new to the humanities but long known to unite evolutionary dynamics in the life sciences.⁴⁴ The advantage of using mathematics is not only that it makes a bridge between humanities and life science, but also that the mathematics can be analyzed and applied. Analysis of the equation explains many empirical observations about human culture. For example, analytical solutions of the equation explain the emergence of multiple adaptive topics of discourse rather than the collapse of discourse into one big topic or into accumulated noise and entropy.⁴⁵ These and other insights led Baciú and his collaborators to apply mathematics and develop digital tools and visualization interfaces.⁴⁶ Such work is an example of research in the humanities that is scientific in uniting disciplines and leading from theory through mathematics to practical applications. We who worked on WE1S hope that methods such as ours might help the humanities meet the challenges, including the grand ones, of working together with other fields.

For the moment, the point of leverage for our project is to share our findings and methods with other researchers and the public, beginning with applications of our research in the form of the "Call-to-Action" and "Call-for-Communication" recommendations cards we have begun creating on our website together with prototype "Research-to-Action Toolkits." These suggest concrete steps to reintroduce the humanities to the public. Some recommendations focus on discourse. For instance, how can researching existing student discourse related to the humanities in campus newspapers prompt new ledes for student journalists? Others use the prominence of humanities-related events in the media as occasion-based ways of reengaging the humanities with the public. For instance, how might a "history harvest" or "literature harvest" bind universities and surrounding communities in shared, meaningful humanities practices?⁴⁷ We hope that others will use our open-access data and findings, and our open-source methods and tools, to create their own findings leading to their own recommendations.

ABOUT THE AUTHORS

Alan Liu is the Principal Investigator of the WhatEvery1Says project and Distinguished Professor of English at the University of California, Santa Barbara. He is the author of *Friending the Past: The Sense of History in the Digital Age* (2018), *Local Transcendence: Essays on Postmodern Historicism and the Database* (2008), *The Laws of Cool: Knowledge Work and the Culture of Information* (2004), and *Wordsworth: The Sense of History* (1989).

Abigail Droge is Assistant Professor of English at SUNY Cortland and a former Postdoctoral Scholar with the WhatEvery1Says project at the University of California, Santa Barbara, where she directed the WE1S Curriculum Lab. She has also worked at Emory University as an ACLS Emerging Voices Fellow and at Purdue University as an Instructor in the Cornerstone Integrated Liberal Arts Program. Her work has appeared in journals such as *Victorian Studies* and the *Journal of Literature and Science*.

Scott Kleinman is a Co-Principal Investigator of the WhatEvery1Says project and Professor of English and Director of the Center for Digital Humanities at California State University, Northridge. He is the author of numerous articles on medieval literature and digital humanities, as well as a developer of the text analysis tool *Lexos*.

Lindsay Thomas is a Co-Principal Investigator of the WhatEvery1Says project and Associate Professor of English at the University of Miami. She is the author of *Training for Catastrophe: Fictions of National Security after 9/11* (2021).

Dan C. Baciu is Assistant Professor of Digital Tools at TU Delft (Delft University of Technology) and a former Postdoctoral Scholar with the WhatEvery1Says project, where he directed the WE1S Interpretation Laboratory. He is a proponent of “humanities mechanics” as a quantitative and causal way of thinking that can explain creativity and diversity in human culture and urban space.

Jeremy Douglass is a Co-Principal Investigator of the WhatEvery1Says project and Associate Professor of English at the University of California, Santa Barbara. He is the author of *10 PRINT CHR\$(205.5+RND(1)); : GOTO 10* (with Nick Montfort, Patsy Baudoin, John Bell, et al., 2012) and *Reading Project: A Collaborative Analysis of William Poundstone's Project for Tachistoscope (Bottomless Pit)* (with Jessica Pressman and Mark C. Marino, 2015).

ENDNOTES

- ¹ Parts of this essay's introduction were adapted from our WhatEvery1Says (WE1S) project website: WhatEvery1Says, “Our Story and Our Results,” <https://we1s.ucsb.edu>.
- ² Paul Reitter and Chad Wellmon, *Permanent Crisis: The Humanities in a Disenchanted Age* (Chicago: University of Chicago Press, 2021), 116.
- ³ Humanities Indicators, *The Humanities in American Life: Insights from a 2019 Survey of the Public's Attitudes & Engagement* (Cambridge, Mass.: American Academy of Arts and Sciences, 2020), 3, <https://www.amacad.org/publication/humanities-american-life>.

- ⁴ WE1S's principal investigator (PI), three co-PIs, and two postdoctoral scholars coauthored this essay, but the project represents the work of nearly one hundred project participants, including seventy-six graduate and undergraduate student research assistants at the University of California, Santa Barbara; California State University, Northridge; the University of Miami; and Illinois Institute of Technology. See "Our Team," WhatEvery1Says, <https://we1s.ucsb.edu/about/team/>. We are not able here to name all contributing individuals, mentioning project members only when citing specific project materials.
- ⁵ We supplemented our methods, however, with surveying, focus groups, and other human subjects research at two of our project's home campuses. See "WE1S Human Subjects Research," WhatEvery1Says, <https://we1s.ucsb.edu/research/we1s-human-subjects-research/>.
- ⁶ We share under open license the "non-consumptive use" data from our corpus, including word frequency counts, computational models and visualizations, and other derived data, but not plain text restricted by copyright or database licensing terms. For access to full datasets and subset collections (with their data, topic models, and visualizations), see "Research Materials Overview," WhatEvery1Says, <https://we1s.ucsb.edu/research/we1s-materials/>. Our tools are also available under open license: "Research Tools Overview," WhatEvery1Says, <https://we1s.ucsb.edu/research/we1s-tools-and-software/>.
- ⁷ For further information on the project's data collection and methods, see Scott Kleinman, Abigail Droge, Lindsay Thomas, and Alan Liu, "Reflections on the Methodology of the WE1S Project," WE1S Research Posts, November 23, 2021, https://we1s.ucsb.edu/research_post/methods-reflection/.
- ⁸ Key finding cards (with reference numbers prefixed "KF") are available at "Key Findings," WhatEvery1Says, <https://we1s.ucsb.edu/research/we1s-findings/key-findings/>. Along with other cards (such as "M" methods cards and "C" collection cards), these are part of the WE1S reporting system, which starts with one-page descriptions of inputs, processes, and outputs. In referring to our cards in this essay, we often excerpt language from them without quote marks.
- ⁹ Percentages are based on our C-32 collection. See Alan Liu, "Collection 32: U.S. Top Newspapers (Sample of All Articles)," WE1S C-32, December 30, 2019, rev. ed. August 14, 2020, <https://we1s.ucsb.edu/wp-content/uploads/C-32.pdf>.
- ¹⁰ See Mauro Carassai, "Top Newspapers Do Not Include the Humanities within Crisis Discourse," WE1S KF-1-1, July 6, 2020, rev. ed. June 1, 2021, <https://we1s.ucsb.edu/wp-content/uploads/KF-1-1.pdf>; Mauro Carassai, "Campus Newspapers Are Much More Focused on the 'Crisis' of the Humanities (Especially in Economic Terms) than Mainstream Media," WE1S KF-1-2, July 9, 2020, rev. ed. July 19, 2020, <https://we1s.ucsb.edu/wp-content/uploads/KF-1-2.pdf>; Mauro Carassai, "The Media (Especially College Newspapers) Provide an Anatomy of Problems in the Humanities that Frames Them within Larger Issues of Higher Education," WE1S KF-1-3, July 13, 2020, rev. ed. July 22, 2020, <https://we1s.ucsb.edu/wp-content/uploads/KF-1-3.pdf>; and Francesca Battista, "After 2008, Academic Humanities Advocates Rallied Against a 'Crisis' Largely Absent from Public Discourse," WE1S KF-4-3, December 5, 2019, rev. ed. July 11, 2020, <https://we1s.ucsb.edu/wp-content/uploads/KF-4-3.pdf>. Reddit data show a less urgent crisis vocabulary of "issues" and "problems," occasionally cresting when circumstances turn "critical." See Raymond Steding, "Students and Others on Red-

- dit See Not the ‘Humanities Crisis’ (the Forest) but Critical Problems and Issues (the Trees),” WE1S KF-6-7, July 22, 2020, rev. ed. September 26, 2020, <https://we1s.ucsb.edu/wp-content/uploads/KF-6-7.pdf>.
- ¹¹ Tarika Sankar, “The Humanities Are the Art of Ordinary Life,” WE1S KF-5-3, January 3, 2020, rev. ed. May 13, 2021, <https://we1s.ucsb.edu/wp-content/uploads/KF-5-3.pdf>. These findings corroborate Michael Levenson’s in *The Humanities and Everyday Life* (New York: Oxford University Press, 2017).
- ¹² Sankar, KF-5-3; and Tarika Sankar, “The Humanities Are Robustly Public in Everyday Events and Activities,” WE1S KF-5-8, July 22, 2020, rev. ed. November 11, 2021, <https://we1s.ucsb.edu/wp-content/uploads/KF-5-8.pdf>.
- ¹³ Joyce McGee Brummet, “Students on Twitter Use ‘Humanities’ to Talk about Daily Academic and Campus Activity,” WE1S KF-6-3, July 1, 2020, rev. ed. November 11, 2021, <https://we1s.ucsb.edu/wp-content/uploads/KF-6-3.pdf>.
- ¹⁴ Wilcoxon and keyphrase extraction data: “Wilcoxon Rank Sum Test and Keyphrase Extraction Data Cited in ‘What Everyone Says: Public Perceptions of the Humanities in the Media,’” Zenodo, July 18, 2021, <https://zenodo.org/record/5711303> (folders: “/daedalus/wilcoxon-tests/top-circulation” and “/daedalus/keyphrase-extraction/top-circulation”).
- ¹⁵ Documents in Collection 21 mention science(s) to humanities at about 25:1. Obituaries in Collection 32 are roughly 1:1 (407:476 documents; 579:573 mentions). A caveat is that we have not factored in demographic data to normalize mentions of science versus humanities in obituaries against deaths per year of people with science versus humanities backgrounds. For more on obituaries, including in student newspapers, see Alan Liu, “The High Proportion of Obituaries Mentioning the Humanities Is One Sign of How the Humanities Radiate through Ordinary Life (and Death),” WE1S KF-5-19, June 7, 2021, <https://we1s.ucsb.edu/wp-content/uploads/KF-5-19.pdf>; and Jessica Gang, “In Student Newspapers, Parents Appear to Be Supportive Instead of Demanding,” WE1S KF-8-7, July 21, 2020, rev. ed. July 25, 2020, <https://we1s.ucsb.edu/wp-content/uploads/KF-8-7.pdf>.
- ¹⁶ Kenia Rodriguez, “Twitter Engagement with ‘Humanities’ Is Mostly Academic in Nature,” WE1S KF-6-2, July 6, 2020, rev. ed. July 22, 2020, <https://we1s.ucsb.edu/wp-content/uploads/KF-6-2.pdf>; and Joyce McGee Brummet, “Academics on Twitter Focus on Jobs for the Humanities, but in Different Contexts for Scholars and Students,” WE1S KF-6-4, July 7, 2020, rev. ed. November 11, 2021, <https://we1s.ucsb.edu/wp-content/uploads/KF-6-4.pdf>. However, Raymond Steding notes Reddit’s broader “ecosystem of discussion about the humanities.” Raymond Steding, “Reddit Is a Rich, Robust Forum for Discussion of the Humanities Providing an Unfiltered Alternative to Published Media,” WE1S KF-6-6, July 22, 2020, rev. ed. October 1, 2020, <https://we1s.ucsb.edu/wp-content/uploads/KF-6-6.pdf>. See also his “A Digital Humanities Study of Reddit Student Discourse about the Humanities,” WhatEvery1Says Research Post, August 1, 2019, https://we1s.ucsb.edu/research_post/a-digital-humanities-study-of-reddit-student-discourse-about-the-humanities/.
- ¹⁷ Tarika Sankar and Alan Liu, “The Humanities Appear to the Public to Be Siloed in Universities (Unlike the Sciences),” WE1S KF-5-2, January 3, 2020, rev. ed. June 6, 2021, <https://we1s.ucsb.edu/wp-content/uploads/KF-5-2.pdf>.

- ¹⁸ Alan Liu, “The Sciences Stand Out for the Public as Distinct Fields (Unlike the Humanities, which Blur Together as Just ‘Academics’),” WE1S KF-5-7, January 14, 2020, <https://we1s.ucsb.edu/wp-content/uploads/KF-5-7.pdf>.
- ¹⁹ For more on the media’s general focus on the “infrastructural humanities” (as observed by WE1S), see Lindsay Thomas and Abigail Droge, “The Humanities in Public: A Computational Analysis of U.S. National and Campus Newspapers,” *Journal of Cultural Analytics* 7 (1) (2022), 36–80, <https://culturalanalytics.org/article/32036-the-humanities-in-public-a-computational-analysis-of-us-national-and-campus-newspapers>.
- ²⁰ Some fields defined as humanities in the 1965 Act establishing the National Endowment for the Humanities receive little media attention. In “The Media Covers Only a Fraction of the Humanities Areas the NEH Was Established by the U.S. Congress to Support,” WE1S KF-7-2, July 15, 2020, rev. ed. July 21, 2020, <https://we1s.ucsb.edu/wp-content/uploads/KF-7-2.pdf>, Christina Roberts writes: “Studying our Collection 1 . . . we found that only five out of eleven subjects in the NEH definition truly appear in media discourse about the humanities . . . language, literature, history, philosophy, and the arts.”
- ²¹ To make such comparisons possible, WE1S tagged publications by region, politics, identity, medium, and other categories: “Metadata Tags for WE1S Document Sources,” WhatEvery1Says, <https://we1s.ucsb.edu/research/metadata-tags/>.
- ²² Wilcoxon test results comparing public and private institutions: “Wilcoxon Rank Sum Test and Keyphrase Extraction Data Cited in ‘What Everyone Says: Public Perceptions of the Humanities in the Media,’” folder “/daedalus/wilcoxon-tests/public-private.”
- ²³ Ibid., “/daedalus/wilcoxon-tests/womens-coed,” “/daedalus/wilcoxon-tests/religious,” and “/daedalus/wilcoxon-tests/liberal arts.”
- ²⁴ Ibid., “/daedalus/wilcoxon-tests/private-public.”
- ²⁵ Ibid., “/daedalus/wilcoxon-tests/hsi” and “/daedalus/wilcoxon-tests/community-college.”
- ²⁶ On these questions and related issues in the WE1S project, see Giorgina Paiella, “Thoughts on Diversity in the Archive,” WhatEvery1Says Research Post, July 23, 2018, https://we1s.ucsb.edu/research_post/thoughts-on-diversity-in-the-archive/.
- ²⁷ For example, see WhatEvery1Says, “Collection 33: Articles Classified as Being about the Humanities or the Sciences from U.S. Top-Circulating Newspapers and Student Newspapers, c. 1998–2018–100 Topic Model,” Topic 16, May 15, 2020, http://harbor.english.ucsb.edu:10002/collections/20200515_1455_us-classification-results-top-newspapers-universitywire-hum-sci/dfr-browser/topics100/#/topic/16.
- ²⁸ Although the press might turn to individual humanists as authorities on cultural discourses about diversity and inclusion, overall, there is little media discussion of how research in the humanities intersects with issues concerning race, ethnicity, gender, or sexuality within the time frame of our study (which collected media materials up until 2019 prior to more recent public political controversy about critical race theory). See Jamal Russell, “Public Discourse as Represented in the Media Treats Humanists as Authorities on Cultural Discourse about Race, Racism, and Ethics,” WE1S KF-3-1, January 3, 2020, rev. ed. May 31, 2021, <https://we1s.ucsb.edu/wp-content/uploads/KF-3-1.pdf>; and sam goli, “Contributions of the Academic Humanities to Thought on Gender and Sexual Identity Have Little Impact on Media Coverage of These Issues,” WE1S KF-3-5, July 14, 2020, rev. ed. August 26, 2020, <https://we1s.ucsb.edu/wp-content/uploads/KF-3-5.pdf>. For more on the relation between the humanities and social groups in the

- media, see Melissa Filbeck, “Discussions in the Media about Gender and Sexual Identity Reveal Conflicting Attitudes about the Humanities,” WE1S KF-3-2, July 16, 2020, rev. ed. July 24, 2020, <https://we1s.ucsb.edu/wp-content/uploads/KF-3-2.pdf>; Susan Burtner, “In Student Newspaper Articles that Mention the Humanities and Liberal Arts, Race Dominates Conversations around Diversity,” WE1S KF-3-3, July 20, 2020, rev. ed. July 28, 2020, <https://we1s.ucsb.edu/wp-content/uploads/KF-3-3.pdf>; Jamal Russell, “Opposing Views on Diversity in the Humanities Mobilize the Same Language in Different ‘Frames’ of Understanding,” WE1S KF-3-4, July 22, 2020, rev. ed. August 22, 2020, <https://we1s.ucsb.edu/wp-content/uploads/KF-3-4.pdf>; Surojit Kayal, “In Both Mainstream and Student Journalism, Universities Appear to be Dominated by Liberals in Ways that Impair Intellectual Diversity,” WE1S KF-4-2, July 27, 2020, rev. ed. October 10, 2020, <https://we1s.ucsb.edu/wp-content/uploads/KF-4-2.pdf>; and Helen Foley, “Student Journalists Act as Social Inclusivity Activists by Promoting the Importance of Education,” WE1S KF-8-6, July 16, 2020, rev. ed. July 30, 2020, <https://we1s.ucsb.edu/wp-content/uploads/KF-8-6.pdf>.
- ²⁹ On challenges WE1S faced in preparing a representative corpus to address issues related to the humanities and underrepresented groups, see Samina Ali, “Newspaper Corpus Design and Representativeness Report,” WhatEvery1Says, May 31, 2018, <https://we1s.ucsb.edu/research/we1s-findings/reports/scoping-research-reports/newspaper-corpus-design-and-representativeness-report/>; Paiella, “Thoughts on Diversity in the Archive”; Giorgina Paiella, “Diverse Populations News Sources,” WhatEvery1Says, July 3, 2018, <http://we1s.ucsb.edu/diverse-populations/>; Joyce McGee Brummet, Colleen Tripp, and Katie Wolf, “Media Representation and Diverse Populations,” WhatEvery1Says, July 30, 2018, https://we1s.ucsb.edu/research_post/media-representation-and-diverse-populations/; Giorgina Paiella and Tyler Shoemaker, “Scoping Representativeness,” WhatEvery1Says, July 23, 2018, https://we1s.ucsb.edu/research_post/scoping-representativeness/; Tyler Shoemaker, “Methods Issues & Limitations: Models Tend to Elide Political Differences,” WE1S M-100, July 1, 2020, rev. ed. July 7, 2020, <https://we1s.ucsb.edu/wp-content/uploads/M-100.pdf>; and Susan Burtner, Melissa Filbeck, sam goli, et al., “Methods Issues & Limitations: Word Order Matters,” WE1S M-101, July 16, 2020, rev. ed. November 12, 2021, <https://we1s.ucsb.edu/wp-content/uploads/M-101.pdf>.
- ³⁰ Alan Liu, “The Public Likes to Take Its Science with Objects, the Bigger or Stranger the Better,” WE1S KF-5-4, December 4, 2019, rev. ed. June 6, 2021, <https://we1s.ucsb.edu/wp-content/uploads/KF-5-4.pdf>.
- ³¹ On the relationship between events and the humanities, see Sankar, KF-5-8; Tarika Sankar, “Philosophy Bridges Outward from the Academy through Controversial Social Debates rather than Concrete Events or Activities,” WE1S KF-5-9, July 27, 2020, rev. ed. August 2, 2020, <https://we1s.ucsb.edu/wp-content/uploads/KF-5-9.pdf>; Tarika Sankar, “‘History’ Gains More Traction in Public Media Discourse Outside the Academy Compared to Literature and Philosophy,” WE1S KF-5-10, July 27, 2020, rev. ed. August 3, 2020, <https://we1s.ucsb.edu/wp-content/uploads/KF-5-10.pdf>; and Tarika Sankar, “Literature Has a Split Personality in the Media. It Is Tied to the Academy, yet Bridges to Public Life in Everyday Book & Reading Events,” WE1S KF-5-11, July 28, 2020, rev. ed. October 14, 2020, <https://we1s.ucsb.edu/wp-content/uploads/KF-5-11.pdf>.
- ³² See Thomas and Droge, “The Humanities in Public,” for conclusions from WE1S’s data about “communicated humanities” versus “communicated sciences.” See also Lindsay Thomas and Abigail Droge, “What We Learned about the Humanities from a Study of

Thousands of Newspaper Articles,” *Journal of Cultural Analytics*, May 24, 2022, 139–144, <https://doi.org/10.22148/001c.35907>.

- ³³ For how the media represents the value(s) of the humanities, see Phillip M. Cortes, “The Media Assesses the Value of the Humanities both Economically and Intrinsically—but the Great Recession Changed the Balance of the Discussion,” WE1S KF-4-1, April 27, 2020, rev. ed. August 2, 2020, <https://we1s.ucsb.edu/wp-content/uploads/KF-4-1.pdf>; Francesca Battista and Surojit Kayal, “Students Writing in Campus Newspapers Argue that the Humanities Help Us Engage Meaningfully with Human Nature and Society,” WE1S KF-4-5, December 5, 2019, rev. ed. July 8, 2020, <https://we1s.ucsb.edu/wp-content/uploads/KF-4-5.pdf>; Phillip M. Cortes, “One Narrative that the Media Promotes Is that Intrinsic Humanistic Values Lead to Jobs, Grants, and Other Tangible Outcomes,” WE1S KF-4-9, July 9, 2020, rev. ed. July 19, 2020, <https://we1s.ucsb.edu/wp-content/uploads/KF-4-9.pdf>; Phillip M. Cortes, “Paradoxically, the Media both Promotes and Obscures the Value of Humanities Labor,” WE1S KF-4-10, July 10, 2020, rev. ed. July 28, 2020, <https://we1s.ucsb.edu/wp-content/uploads/KF-4-10.pdf>; and Phillip M. Cortes, “After 2008, Newspapers Moderately Boosted Coverage of the Positive Economic Value of the Humanities,” WE1S KF-4-12, July 30, 2020, rev. ed. May 3, 2021, <https://we1s.ucsb.edu/wp-content/uploads/KF-4-12.pdf>.
- ³⁴ Citizenship is a refrain in justifications of the humanities in Collection 33, 100-topic model. See newspaper articles associated with Topic 22: WhatEvery1Says, “Collection 33,” Topic 22, http://harbor.english.ucsb.edu:10002/collections/20200515_1455_us-classification-results-top-newspapers-universitywire-hum-sci/dfr-browser/topics100/#/topic/22. An exception to the lack of humanities-related discussion of civic action is Topic 61, which is associated with open letters, events, research, and teaching efforts driven by social justice issues: WhatEvery1Says, “Collection 33,” Topic 61, http://harbor.english.ucsb.edu:10002/collections/20200515_1455_us-classification-results-top-newspapers-universitywire-hum-sci/dfr-browser/topics100/#/topic/61.
- ³⁵ See science-related articles in Collection 33, 100-topic model, in particular Topic 14: WhatEvery1Says, “Collection 33,” Topic 14, http://harbor.english.ucsb.edu:10002/collections/20200515_1455_us-classification-results-top-newspapers-universitywire-hum-sci/dfr-browser/topics100/#/topic/14.
- ³⁶ These examples are associated with topics in Collection 33, 100-topic model. In relation to Topic 22, see Borden Painter, letter to the editor, February 25, 2009, in response to “Humanities and the Examined Life,” *The New York Times*, March 1, 2009; and Nicole Felkins, “Editorial: Humanities Are What Makes Us Human,” *The Pacifican: University of the Pacific*, November 6, 2014. In relation to Topic 100, see “Governor’s Threat to Desubsidize Liberal Arts Education Falls Flat,” *The Wellesley News: Wellesley College*, February 20, 2013. For how students discuss the humanities in relation to job skills, see Rebecca Baker, “Students Writing about Education Value Cognitive Flexibility and ‘Soft Skills’ Associated with the Humanities and Liberal Arts,” WE1S KF-8-1, February 10, 2020, rev. ed. March 22, 2021, <https://we1s.ucsb.edu/wp-content/uploads/KF-8-1.pdf>.
- ³⁷ Executive Office of the President, National Economic Council, Office of Science and Technology Policy, “A Strategy for American Innovation: Driving towards Sustainable Growth and Quality Jobs” (Washington, D.C.: Office of the President, 2009), 6, <https://eric.ed.gov/?id=ED511653>.

- ³⁸ White House, “Fact Sheet: The American Jobs Plan,” March 31, 2021, <https://www.whitehouse.gov/briefing-room/statements-releases/2021/03/31/fact-sheet-the-american-jobs-plan/>.
- ³⁹ See Vanessa Peña and Charles A. Stokes, “Use of Grand Challenges in the Federal Government” (Washington, D.C.: Institute for Defense Analyses, Science & Technology Policy Institute, 2019), <https://www.ida.org/-/media/feature/publications/u/us/use-of-grand-challenges-in-the-federal-government/d10699final.ashx>; and Michelle Popowitz and Cristin Dorgelo, “Report on University-Led Grand Challenges” (Los Angeles: University of California, Los Angeles, 2018), <https://escholarship.org/uc/item/46f121cr>.
- ⁴⁰ Critiques of grand challenges include the special issue on “Grand Challenges of Engineering” of *International Journal of Engineering, Social Justice, and Peace* 1 (2) (2012), <https://ojs.library.queensu.ca/index.php/IJESJP/issue/view/429>; and Joseph V. Sinfield, Ananya Sheth, and Romika R. Kotian, “Framing the Intractable: Comprehensive Success Factor Analysis for Grand Challenges,” *Sustainable Futures* 2 (100037) (2020), <https://doi.org/10.1016/j.sftr.2020.100037>.
- ⁴¹ Heidi Bostic, “The Humanities Must Engage Global Grand Challenges,” *The Chronicle of Higher Education*, March 30, 2016, <https://www.chronicle.com/article/the-humanities-must-engage-global-grand-challenges/>.
- ⁴² Bill & Melinda Gates Foundation, “Global Grand Challenges,” <https://gcgh.grandchallenges.org/challenges/>.
- ⁴³ Dan C. Baciu, “Creativity and Diversification: What Digital Systems Teach,” *Journal of Thinking Skills and Creativity* 41 (100885) (2021), <https://doi.org/10.1016/j.tsc.2021.100885>.
- ⁴⁴ The replicator-mutator equation is best known for its two main special cases: the quasispecies equation and generalized Lotka-Volterra equations; the latter is also referred to as the replicator equation. The equation can be used to derive or mathematically describe compartmental models of epidemiology, the Susceptible-Infectious-Recovered model, the Price equation, evolutionary game dynamics, variation-selection processes, frequency dependent selection, and homeostatic regulation.
- ⁴⁵ See also Dan C. Baciu, “Chicago Schools: Large-Scale Dissemination and Reception,” *Prometheus* 2 (2019): 20–43.
- ⁴⁶ Two such interfaces, GeoD and TimeD, were partly supported in their development by WE1S and first published in Dan C. Baciu, “Cultural Life: Theory and Empirical Testing,” *Biosystems* 197 (104208) (2020), <https://doi.org/10.1016/j.biosystems.2020.104208>. See his Figures 2 and 3 for the use of GeoD and TimeD.
- ⁴⁷ For links to our existing recommendation cards, see “Recommendations Overview,” WhatEvery1Says, <https://we1s.ucsb.edu/recommendations/>. The history harvest idea is borrowed from William G. Thomas, Patrick D. Jones, and Andrew Witmer, “History Harvests: What Happens When Students Collect and Digitize the People’s History?” *Perspectives on History*, January 1, 2013, <https://www.historians.org/publications-and-directories/perspectives-on-history/january-2013/history-harvests>.