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ELSEVIER

## Review

# Why science is revered and rejected

Robbie M. Sutton<sup>1</sup> and Stefan Leach<sup>2</sup>

Scientists and their work are often dismissed, ignored, or attacked, yet in general, science is widely trusted and esteemed. This article examines how these seemingly contradictory attitudes coexist: how can science be both revered and rejected? We outline four models of the relationship between the esteem of science and the frequent rejection of scientific claims. First, although attitudes toward science are generally positive, they are not absolute or unanimous. This gives people *latitude* to reject scientific claims that seem uncongenial to their values, identities, or interests. Second, people may engage in *cherry-picking*: regardless of their overall attitudes toward science, they can selectively accept congenial claims and reject uncongenial ones. Two further models, less documented in the literature, highlight the role of perceived “scienciness”—the extent to which a claim appears prototypically scientific. In the third model, some claims are met with *prejudice* because they are less “sciency” than others a priori (e.g., due to their source or underpinning methods). Thus, the esteem of science may do little to discourage their rejection. The fourth model suggests that uncongenial claims are subject to *desciencing*: in the process of rejecting them, people may strategically downgrade their scienciness (e.g., by consigning them to a marginal subcategory of science). Over time, desciencing may cumulatively alter people’s understandings of science itself, leaving future work vulnerable to prejudice. Together, these models may explain how positive views of science can coexist with, facilitate, and themselves be shaped by the rejection of scientific claims.

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Science is widely esteemed, and confers authority on the people who do it and the claims they make. However, this authority is not always welcome or reassuring. When

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scientific claims seem to threaten cherished values, beliefs, or interests, people are motivated to reject them. In this article, we examine obvious tensions - and propose less obvious synergies - between positive attitudes to science in general (henceforth, *esteem of science*), and negative attitudes to particular examples of science (henceforth, *science rejection*). We start by reviewing the esteem of science, and then outline the challenges - and opportunities - it creates for science rejection.

## The high esteem of science

Science has helped transform the material and social conditions of human life, and has also profoundly impacted human cultures [1]. It has granted human societies a new way of knowing, distinguished from other methods (e.g., authority and logic) by its power to deliver definite progress [2]. Its findings and ideas percolate into popular cultures, and so help provide a shared framework for making sense of reality [3]. It has proved able to coexist (if sometimes uneasily) with seemingly very different knowledge frameworks including superstition [4] and religion [5,6]. Little wonder, then, that research shows that the public are generally highly appreciative of science. A recent large multinational survey revealed that science is highly trusted [7]. Albeit to a lesser extent, scientists are too [7, also 8].

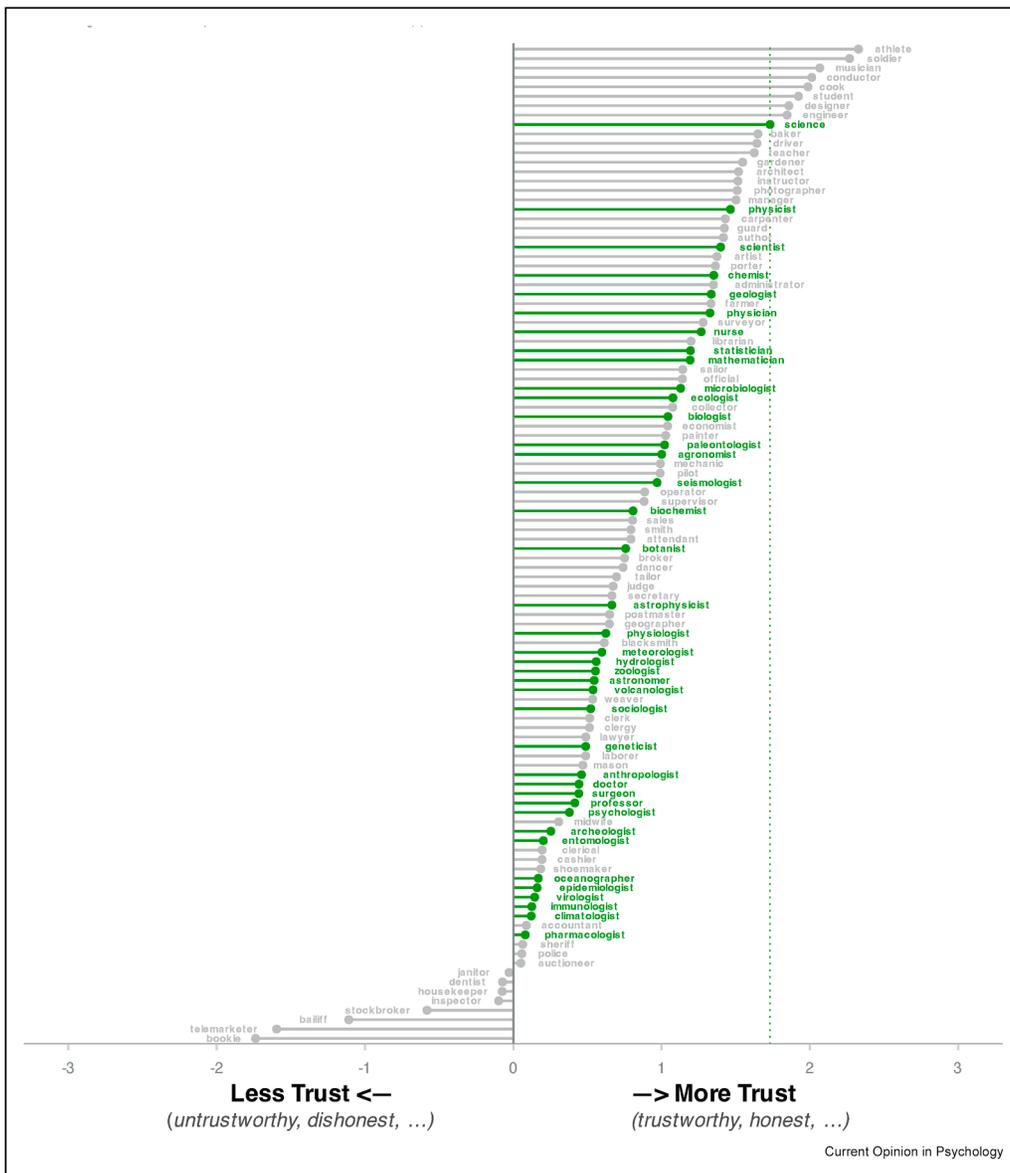
This general trust in science seems to confer trust and authority on scientists and their claims. As we might expect from this, the most prototypically scientific — or *sciency* [9,10] - scientists and claims are trusted the most. For example, research on the ‘seductive allure of neuroscience’ [11,12] shows that people are more persuaded and impressed by precisely the same behavioural science claims when accompanied by neuroscientific evidence, perhaps because “something about seeing neuroscience information may encourage people to believe they have received a scientific explanation” [11, p.471]. Other researchers have experimentally bolstered the scienciness of health and environmental claims (e.g., by using stereotypically scientific terminology to describe the underpinning research), and found that this increases their perceived credibility [10]. Likewise, some scientific occupations (e.g., biologist) are seen as more prototypically scientific than others (e.g., sociologist), and these tend to be rated as more trustworthy and, especially, as more competent [13,14].

To complement this research, we employed a natural language processing technique — word embeddings -

to examine cultural associations between scientific occupations, scienciness, and trust [15]. This technique enables researchers to move beyond traditional surveys and small discourse studies to analyse everyday language at scale [16]. It fits machine learning models to text corpora, often comprising billions of words, to reveal patterns in the co-occurrence of words. These co-occurrences are indicative of semantic and cultural associations, and have been used to explore representations of race, gender, and class, among others [17]. Our analyses conceptually

replicated survey results [7,8] showing general public trust in science and scientists (Figure 1). Likewise, they replicated survey evidence that some scientific occupations are more sciency than others (Figure 2), and that this is positively correlated with trust [12]: the more closely an occupation is associated with science, the more it tends to be associated with trust, and especially competence [13,14] (Figure 3). These results confirm survey evidence that science is held in high esteem, and transfers to scientific occupations that are the most sciency.

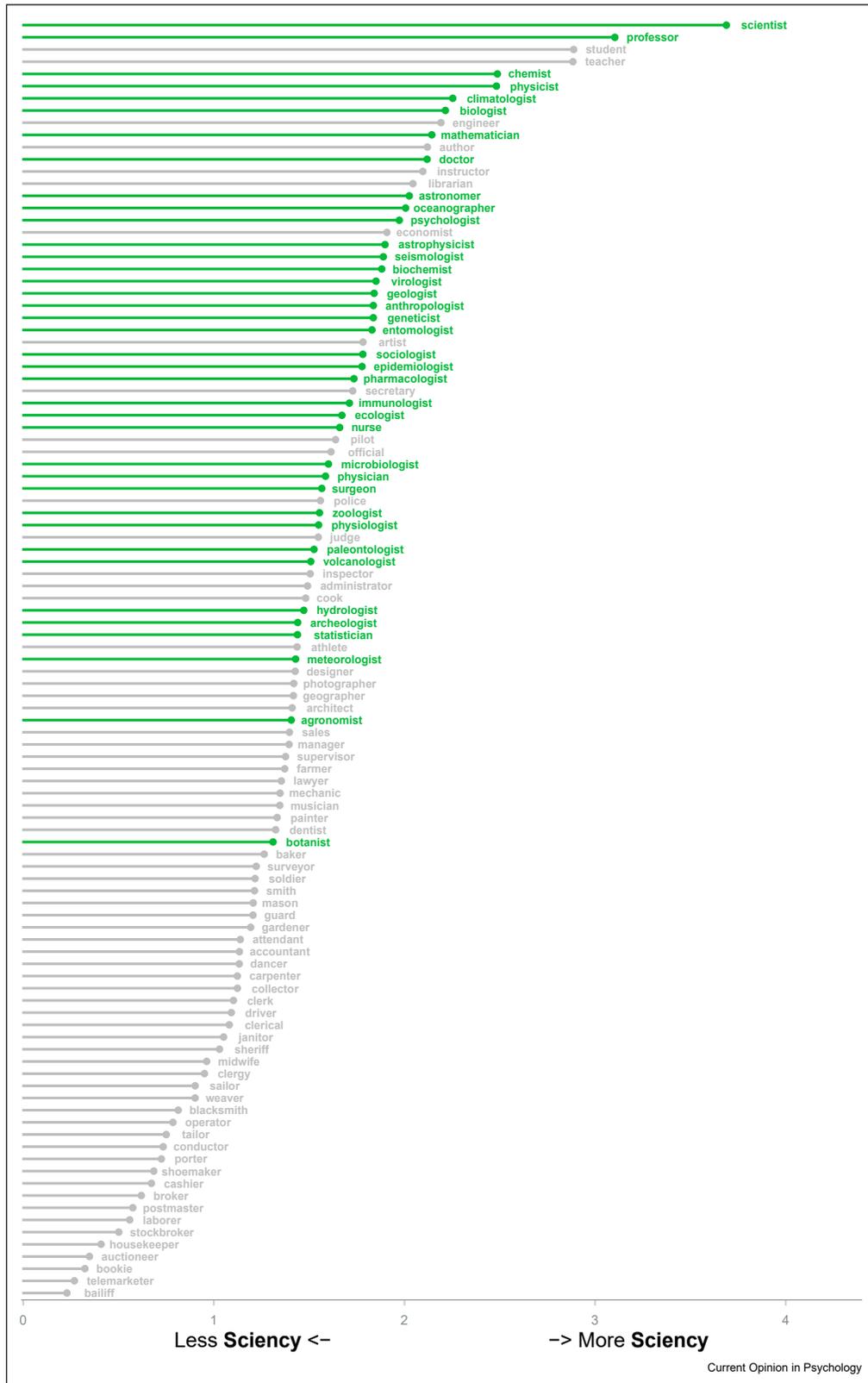
Figure 1



**Cultural associations of 105 occupations with trust**

Scientific occupations (green) are uniformly associated with trust (>0), but less strongly than the general term of science. Cultural associations are derived from word co-occurrences and quantified via the cosine similarity of their corresponding word embeddings [see 16]. Indices are derived from computing the similarity to trust minus distrust. Higher scores indicate greater similarity to trust, lower scores the opposite.

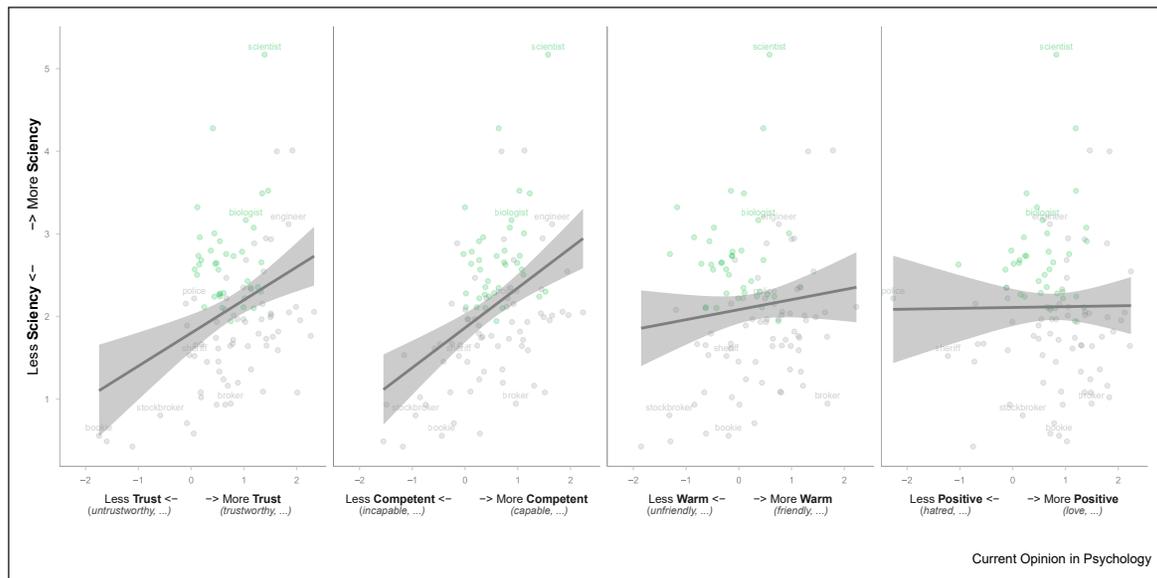
Figure 2



**Cultural associations of 105 occupations with science**

Scientific occupations (green) are consistently associated with science (>0). Indices of similarity are derived from computing the cosine similarity. Higher scores indicate greater similarity to science, lower scores the opposite.

Figure 3



#### Cultural associations between science, trust, competence, warmth and positivity across 105 occupations

Occupations which are more similar to *science* (i.e., sciency) also tend to be more similar to *trust* ( $r = .40, p < .001$ ) and *competence* ( $r = .51, p < .001$ ). The scienciness-trust correlation holds when we only examine *scientific* occupations: those that are more sciency are trusted more ( $r = .38, p = .002$ ). Similarity to *science* is unrelated to positivity or warmth ( $r_s < .28, p_s > .195$ ). Indices of similarity are derived from computing the cosine similarity. Higher scores indicate greater similarity, lower scores the opposite. Scientific occupations are marked in green.

### Understanding the relationship between positive attitudes to science generally, and negative attitudes to some science

How, then, do we reconcile the high cultural and psychological value of science in general with the widespread rejection of scientific findings, consensus, and advice, even on vitally important topics such as climate change and vaccination [18]? To answer this question, we extract two well-established models from the existing literature, and propose two more novel ones. These models identify multiple routes to science rejection, involving different psychological mechanisms, and different strengths or directions of relationships between the esteem of science and science rejection (see Figure 4 for a visual summary of these relationships).

#### Latitude

Though trust in science is generally high, it is neither unanimous nor absolute [Gauchat, 2023]. Most but not all of the public trust science and scientists, leaving room for a significant minority to reject specific scientific conclusions [7]. Likewise, most people's attitudes to science may be more ambivalent than headline survey results suggest [19]. Thus, even though people's attitudes to science in the abstract are generally positive, and negatively related to science rejection, there is sufficient *latitude* for them to engage in some science rejection with relatively little dissonance. For example,

people who feel more psychologically distant from science are more skeptical of settled scientific positions on topics including climate change, vaccines, and evolution [20].

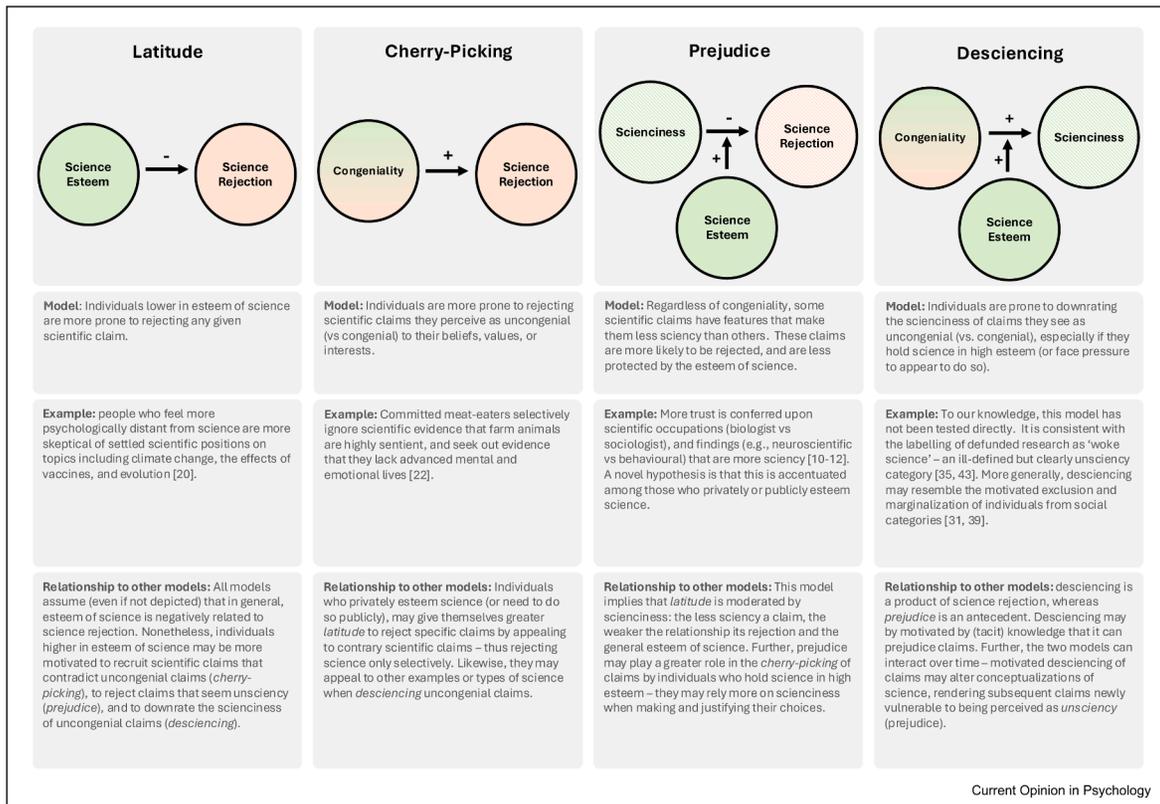
#### Cherry-picking

This model does not assign a particular causal role to esteem of science. There is no necessary effect of esteem of science and science rejection, which instead depends on the congeniality or uncongeniality of science. People, for example, identify more flaws in uncongenial than congenial science [21]. They seek out [22] and recruit [23] contrary scientific findings or opinions, *cherry-picking* evidence and arguments [18]. For example, political communicators who wish to downplay public concern about climate change have been able to cherry-pick from divergent assessments of polar ice cap loss, to downplay its seriousness [24].

#### Prejudice

This third model is closely informed by research on the relationship between scienciness and trust. In this model, scienciness is an *antecedent* of science rejection. If a scientific claim has features that make it seem less sciency a priori (i.e., even before its results are known), then it faces a kind of *prejudice*: it may be little protected by the general authority of science. One prediction of this model has, as we have seen, already

Figure 4



**Four models of relationships between the general esteem of science and the rejection, congeniality, and scienciness of particular scientific claims**

Science Esteem refers to the esteem of science in general (e.g., an individual's trust in science). Science Rejection refers to the rejection of a particular scientific claim. Congeniality refers to the degree to which a claim is perceived to support (vs. threaten) an individual's beliefs, values, or interests. Scienciness refers to how prototypically scientific the claim appears.

been tested: less sciency research is perceived as less credible [10–12], and less sciency occupations are seen as less competent and trustworthy [13,14]. Another prediction has not been tested, to our knowledge: these effects should be larger among people who value science more strongly. Their judgements of trust and credibility should be more sensitive to how sciency a scientist or their work seems. Though not required by this model, it is even possible that people who value science highly in general are *more* prone to rejecting relatively unsciency claims.

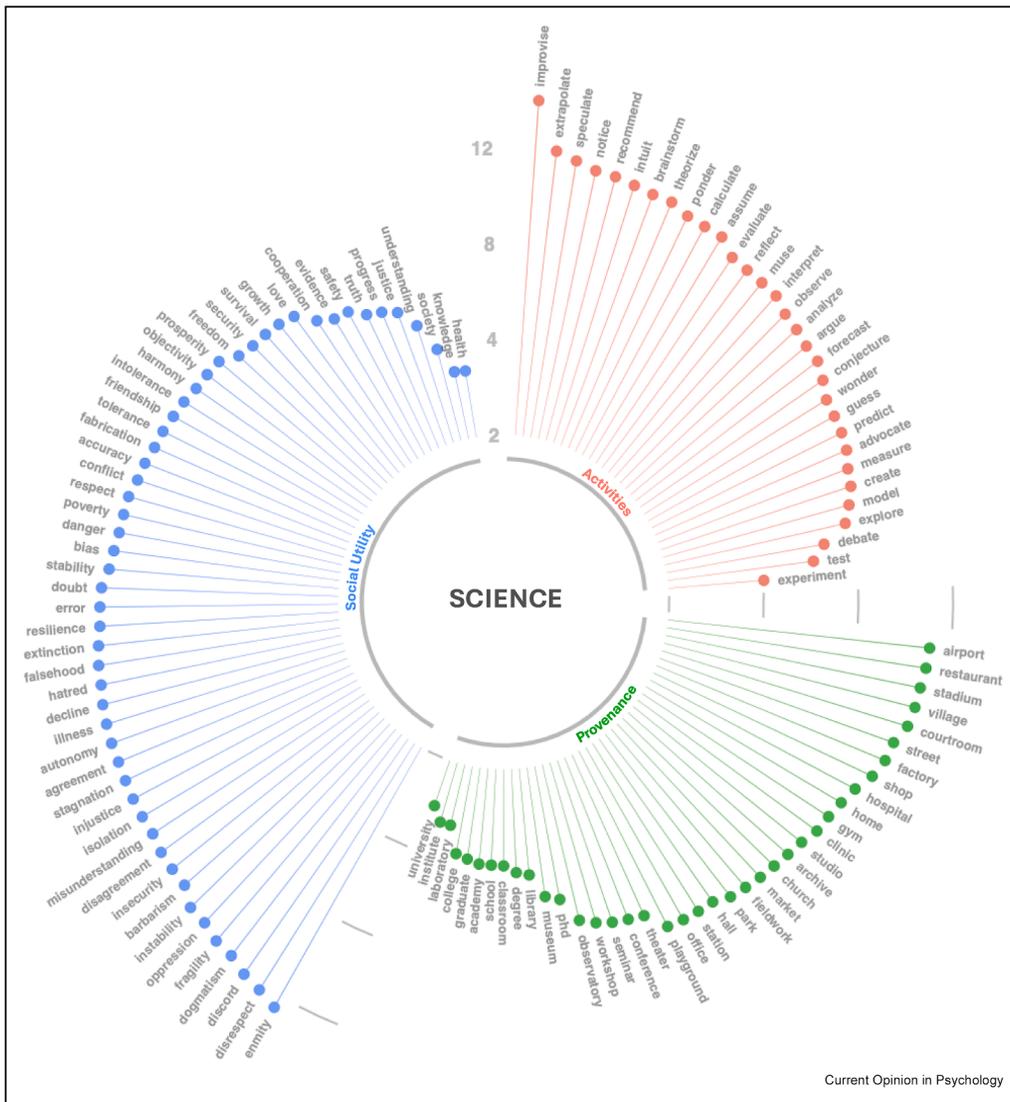
We can better realize the potential explanatory power and generativity of this model by better understanding people's conceptions of science – and therefore, what makes claims seem more or less sciency. Indeed, scholars have called for more research on the structure and content of people's concept of science [19,25,26]. However, there is already evidence that the public see science as having defining characteristics including *provenance* (e.g., conducted in recognized institutions), *activities* (e.g., experiments and observations [27], and

*social utility* [28]. As shown in Figure 5, this was borne out by our own [15] word-embeddings analyses of cultural associations in natural language. These analyses showed that the concept of science is culturally associated more with some sources, activities, and social outcomes (benefits) than others. This suggests, for example, that a scientific *experiment* is likely to be seen as more sciency than a scientific *model*, and in turn, a scientific *forecast*. In turn, it is likely to be seen as trustworthy - especially by those who esteem science highly.

**Desciencing**

In this fourth model, which to our knowledge has not been proposed or tested before in the psychological literature, scienciness is not (merely) an antecedent of science rejection, but its *product*. When people are motivated to reject an uncongenial scientific claim, they may be motivated to strip it of authority by downgrading its scienciness. For example, people who oppose action to mitigate climate change (e.g., so-called climate 'denialists' [29]) may perceive a study as unsciency if its findings highlight the dangers of climate change, but

Figure 5



**Cultural associations with science according to activity, provenance, and social outcome**

Color coded domains of science understanding: *Activities* by which knowledge is generated, accumulated and disseminated (red), *provenance*, referring to individuals, credentials, institution from which knowledge may emanate, and words referring to the satisfaction or frustration of existential, relational, and epistemic needs-or *social utility* (blue) [28]. The terminology and operationalization is derived from but broadens an earlier conceptualization of legitimizing characteristics of science -respectively methods, social location, and accord [26]. Indices of closeness are derived from computing the euclidian distance. Smaller distances indicate greater similarity to science; greater distances the opposite.

science if its results seem to downplay those dangers. We expect people who strongly value science – or who need to publicly appear to do so [30] – to be especially prone to ‘desciening’ scientific claims in this way. For them, the general esteem of science is especially strong, and conferring it to uncongenial claims is especially uncomfortable.

As with the prejudice model, understanding people’s conceptions of science helps generate hypotheses about how, exactly, people descience claims. For example, imagine that scientists from a prestigious institution forecast dangerous increases in climate change. On one dimension of categorization (activity), this is not especially sciency, since forecasts are less

strongly associated with science than other activities such as experiments and observations. On another dimension (provenance), it is highly scientific, since prestigious institutions are strongly associated with science [15] (see Figure 5). A climate ‘denialist’ who finds the forecast uncongenial may downgrade its scientificity by paying more attention to the activity (forecasting) than the provenance. In contrast, a climate ‘warmist’ [29] may perceive it as more scientific by strategically paying less attention to the activity and more to its provenance. These predictions are informed by research on how people strategically pay attention to different dimensions of a group category in order to include or marginalise different individuals [31].

People also may desecrate claims by creatively leveraging existing categories, and constructing new ones. People can strip uncongenial work of its authority by excluding it altogether from science (e.g., “this is not science, but advocacy” [32,33]). They can also consign it to some less authoritative subset of science, either established (e.g., “junk science” [34]), or new (e.g., “woke science” [35]). In much the same way as people who are strongly attached to group identities and stereotypes spend more time and effort on motivated categorical reasoning [31,36–39], so might people who are strongly attached to the value of science. In the final section of this article, we explore a recent, poignant example of this phenomenon, and consider the interplay between the models outlined in this article.

## Conclusions

This article has grappled with the apparent tension between the esteem of science and science rejection, and has outlined four models that help resolve it. First, since science is not trusted unanimously or absolutely, people have *latitude* to reject unwelcome examples of science. Second, whether or not science in general is highly trusted, people can *cherry-pick* science, marshalling examples of science that suit their purposes and rejecting examples that do not. Third, some science may have prior features that are less prototypical of science – and therefore faces a kind of *prejudice* that strips it of some of the authority of science. Fourth, to help them reject some science, people may find ways to *desecrate* it – that is, to represent it as less scientific. These models are by no means mutually exclusive: they can operate simultaneously, and may influence each other recursively (Figure 4) see also Figure S1 in Supplementary Materials. Together, they help us understand that the esteem of science and science rejection may not only be compatible, but in certain respects, synergistic.

We illustrate these points by considering the interplay between prejudice and desecrating, which can be understood as two sides of the same coin: *boundary work*. Boundary work is a process that sociologists of science have described as routine within the scientific community [40]. It gives science “particular ... borders and territories”, distinguishing science from other activities, and types of science from each other. These categories matter, because science, and especially some types of science, can “enhance the credibility of one contestant’s claim over those of other authorities” [40]. Boundary work is not inherently nefarious. As the COVID-19 epidemic showed, we must distinguish more scientific from less scientific claims [41], and be prepared to view the latter with prejudice. Likewise, the esteem of science would be eroded if just any claim were regarded as equally scientific. Boundary work therefore serves two complementary purposes – protecting the authority of science, and conferring that authority selectively [40].

Boundary work is more contentious, however, when it desecrates research on ideological grounds (à la our fourth model) [42]. In 2025, the U.S. Government identified over 3000 “Woke DEI Grants”, that, according to a press release quoting Ted Cruz, “have poisoned research efforts, eroded confidence in the scientific committee, and fueled division among Americans”. This was followed by wholesale cancellation of research grants, allegedly to “end the politicization of NSF funding and restore integrity to scientific research” [43]. This boundary work positioned cuts to science funding as a move *for science*, by protecting it from *some science* – specifically the marginal subcategory of ‘woke science’ [35]. This desecrating associated ‘woke science’ with social disbenefits – discord, dogmatism, and bias – that are remote from the public concept of science as a socially beneficial enterprise (Figure 5) [15], and in this way arguably weaponized the esteem of science.

This example highlights several points that could inform future research on science rejection. First, though it varies between individuals, the esteem of science is ultimately a cultural phenomenon, meaning that it constrains people regardless of the esteem in which they hold science. The actors responsible for the NSF cuts may or may not have held science in high esteem privately, but accountability demands [44] meant they had to appear to esteem science publicly [30]. An overt attack on science as a whole may have been politically unsustainable in a country so invested in science and technology. Second, the esteem of science can also be weaponized by adept communicators against some science – illustrating how it can justify as well as constrain

science rejection [40]. Third, innovative boundary work, especially by political leaders [45], may have the power to shape public conceptions of science. For some communities, the denigrated subcategory ‘woke science’ may become salient, and foment an automatic tendency to perceive research adjacent to DEI issues as less sciency. In this way, boundary work may be recursive: today’s desciening might inform tomorrow’s prejudice. For these reasons and others highlighted in this article, we should not take too much succor from the public’s exaltation of science in the abstract [7,15]: it may often fail to prevent, and may sometimes enable, negative responses to scientists and their work.

### Credit statement

Robbie Sutton: Conceptualization; Writing -original draft. Stefan Leach: Visualization; Writing – review and editing.

### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.copsy.2025.102234>.

### Data availability

No data was used for the research described in the article.

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\* of special interest

\*\* of outstanding interest

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## Further information on references of particular interest

10. Shows that people's judgements of how scientific a research study vary, are correlated with, and causally impact, the credibility of claims based on its findings. \*\*
13. Examines prototypicality and dimensional social evaluations (e.g., competence, warmth, morality) of 45 scientific occupations. Shows clear heterogeneity in these occupations – biologists, chemists and physicists are the most prototypical. Prototypicality is very strongly ( $r = .87$ ) associated with competence, and uniquely predicted by it. \*\*
15. This preprint uses word embeddings to replicate and extend survey findings on the structure and content of lay people's concept of science, and trust, scienciness, and related judgements of scientific occupations. \*\*
18. A comprehensive, original review of how different theories of science rejection, corresponding more or less to latitude and cherry-picking in the present article, can be reconciled. \*
19. Examines folk conceptions (social representations) of science, including their structure and correlates, by subjecting open-ended survey responses by Italian participants to text analyses. Shows generally positive attitudes to science, but also some ambivalence. Works toward understanding the structure of science. \*
26. Outlines three defining dimensions of the lay concept of science. Based on a limited number of items used in large-scale public surveys, but offers a promising approach to outlining the structural features of the public's understanding of science. \*\*
31. A review the categorization literature arguing that people selectively weight distinctive dimensions of social categories to make motivated decisions. Extrapolating to judgments of scienciness, people may selectively use defining dimensions of science to exclude or marginalize unwelcome science. \*\*
38. Develops a computational account of stereotype change based on principles of structure learning. It allows for flexible construction of categories, and nesting of categories. Accounts like this can help formalise predictions from the models - operating jointly and individually - outlined in the present article. \*
40. Provides extensive philosophical and sociological commentary on what science means to the public, its cultural authority, and the social importance of the boundary work that delineates science from other activities, and types of science from each other. \*\*
43. A press release that arguably exemplifies motivated processes of desciening by actors who cannot afford to openly disparage or attack science as a whole. It leverages the term 'woke' to discredit science associated with DEI, and in turn to present the protection of science as the motivation of cuts in science funding. \*