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Trends in Cognitive Sciences

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Opinion

Toward an understanding of collective intellectual humility

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The study of intellectual humility (IH), which is gaining increasing interest among cognitive scientists, has been dominated by a focus on individuals. We propose that IH operates at the collective level as the tendency of a collective's members to attend to each other's intellectual limitations and the limitations of their collective cognitive efforts. Given people's propensity to better recognize others' limitations than their own, IH may be more readily achievable in collectives than individuals. We describe the socio-cognitive dynamics that can interfere with collective IH and offer the solution of building intellectually humbling environments that create a culture of IH that can outlast the given membership of a collective. We conclude with promising research directions.

Highlights

Like individuals, collectives can possess intellectual humility.

A collective's intellectual humility is not strictly reducible to the sum of the intellectual humility of its members.

Collective intellectual humility is the tendency of members of a collective to attend to one another's intellectual limitations and the intellectual limitations of their collective cognitive efforts.

Given people's propensity to better recognize others' limitations than their own, intellectual humility may be more achievable in collectives than in individuals.

Social support and institutional scaffolding are crucial to promoting collective intellectual humility.

From individual to collective IH

People's tendency to recognize and attend to their intellectual limitations, known as IH, is associated with epistemic and social benefits. These benefits include superior information processing [1], possessing more knowledge [2], and lower acceptance of fake news [3–5], misinformation [4–8], and unwarranted conspiracy theories [3–5,9–11]. IH has been linked to a reduction in cognitive and social biases, including political **myside bias** (see Glossary) [9], ideological polarization [12,13], and outgroup prejudice [14,15]. These findings underlie growing enthusiasm about IH in the cognitive sciences.

IH in individuals has been labeled a social lubricant because it can promote qualities such as trust and forgiveness, resulting in collective outcomes such as constructive intellectual exchanges [16,17]. Yet, the body of research on IH is limited in that it has focused almost exclusively on **individual IH**. Consequently, little is known about how IH operates on a collective level.

This paper is a response to recent calls for a greater focus on **collective IH** [18–21]. IH has been described as a social–ecological, rather than a person-centric, phenomenon [22]. If this is correct, then the levels and variants of humility found in groups are more important than those exhibited by individuals [18]. Collective IH deserves greater attention because humans routinely make decisions in collective contexts, whether in small teams, large organizations, or entire societies. An organizing framework for understanding collective IH is needed to advance understanding in this area.

We offer a conceptualization of collective IH (Figure 1, Key figure). We propose that collective IH is the tendency of a collective's members to attend to each other's intellectual limitations and to the limitations of their collective's cognitive efforts. Furthermore, we argue that IH is more readily achieved in collectives than in individuals because individuals are less attuned to their own intellectual limitations than those of others [23–25]. This stubborn tendency interferes with the

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Key figure

Conceptualization of collective intellectual humility

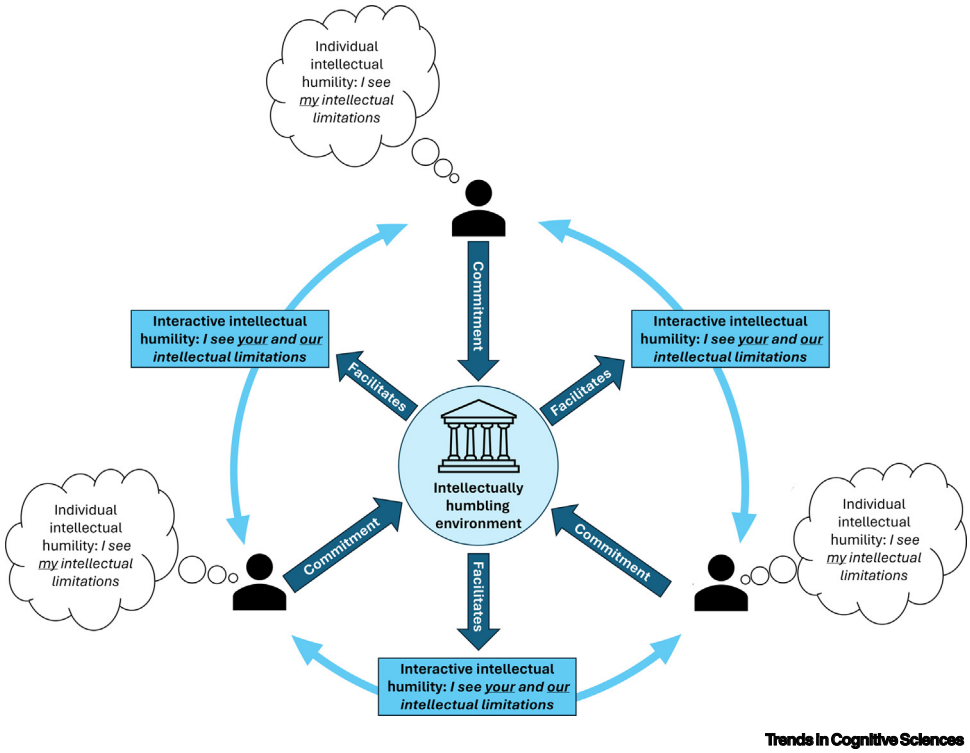


Figure 1. This figure illustrates individual and collective levels of intellectual humility. We propose that collective intellectual humility involves the combination of interactive intellectual humility and the commitment of members of a collective to the norms, policies, and procedures of an intellectually humbling environment.

development of IH in individuals but can divide the cognitive labor required to manifest collective IH in deliberative contexts [26,27]. In these contexts, individuals can usually count on each other to notice and respond to their intellectual limitations. However, there are cognitive and social dynamics that interfere with this process, which can lead to polarization. These dynamics can be minimized in intellectually humbling environments. We will describe some features of humbling environments and outline strategies for producing and maintaining them. Finally, we will outline future directions for research on collective IH, including investigating the relationship between humbling interactions and environmental **scaffolding** used to support and facilitate collective IH, assessing the efficacy of various environmental interventions, and developing tools to measure collective IH and assess its relationship to individual IH.

Conceptualizing IH at the individual and collective levels

Most scholars agree that IH involves the tendency to recognize and attend to one's intellectual limitations, such as gaps and inaccuracies in information and unreliable cognitive processes [20,28,29]. The manifestation of IH can include both self-facing and other-facing epistemic behaviors. Admitting unknowns, admitting intellectual mistakes, and avoiding overly confident pronouncements have been used as indicators of IH [30–33]. Intellectually humbler people,

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aware that they are not omniscient or infallible, also value other people's insights and are open to learning from others. They are likely to seek input from others, compliment or point out valid points in opposing views, listen intently to others, and consider multiple perspectives [33].

We argue that conceptualizations of IH should be extended to collectives [19]. Our account of collective IH applies to both group agents [34], such as teams, corporations, and juries, as well as looser collectives, such as scientific communities and discussion forums. This is not to say that all collectives are candidates for IH. Social groups defined haphazardly, such as right-handed Europeans, are less likely to develop the sort of distinctiveness, cohesiveness, and entitativity required for the possession of collective traits. Only if such collectives work toward a shared goal or develop a social identity might they be candidates for collective IH [35–37].

Collectives, like their constituent members, have intellectual limitations, such as incomplete information, reliance on biased or incomplete arguments, and faulty deliberation or decision-making processes. Like individuals, collectives generally benefit from recognizing and attending to such limitations. But how do they do so? On a straightforwardly summative view, collectives manifest IH when all or most of their members recognize and attend to their own intellectual limitations [19]. Yet, individuals can also recognize and attend to one another's intellectual limitations when engaged in deliberation or working toward a shared goal. An interlocutor might respectfully point out an unnoticed bias, inconsistency, or gap in another's reasoning so that it can be seen and appropriately acted upon. Some groups are more likely to value accuracy and belief updating [38]. Furthermore, collective deliberation can reveal intellectual limitations that are shared by all or most participants. Having exchanged reasons for a variety of views without making much progress, a committee might discover that they are poorly positioned to make a well-informed decision.

Thus, we argue that collective IH can take the form of an interactive virtue, a virtue that results from 'mutual interactions between group members and the group's structure and culture' (see page 370 in [39]). In this way, the IH of a collective may transcend the aggregate of the individual IH of its members, similar to collective intelligence [40] and collective decision-making [41,42]. At the same time, some collectives may exhibit less IH than their members. Unhealthy norms, procedures, and leadership can undercut IH within groups. This is why collective IH is worthy of study in its own right.

We propose that collective IH is the tendency of collectives to recognize and attend to the intellectual limitations of both their individual members and their collective cognitive efforts. This typically requires that the following two conditions are met: (i) that individuals recognize and attend to the intellectual limitations of each other and of the collective through constructive interactions and (ii) that collectives implement scaffolding that facilitates (i). The second condition involves members adopting norms, incentives, constraints, and policies that promote intellectually humbling interactions.

As is the case with individual IH, collective IH can be motivated by a concern for truth and knowledge [29] and should not primarily result from a desire to belittle others or make oneself look good [43]. To this end, group members will benefit from pointing out and responding to the intellectual limitations of others in constructive ways that promote productive deliberation. However, we hold out the possibility that groups might occasionally stumble into collective IH through belligerent group members or attempts at self-promotion, for example, when social rewards are aligned with collective IH.

Collectives that manifest IH will behave like intellectually humble individuals in several respects. Their members will be open and responsive to criticisms, coming both from within and outside

Glossary

Collective intellectual humility (IH): the tendency of collectives to recognize and attend to the intellectual limitations of both their individual members and their collective cognitive efforts.
Group polarization: the tendency of like-minded collectives to reason toward a more radical version of the view that they shared before deliberating.
Individual IH: an individual recognizing and attending to personal intellectual limitations, such as gaps and inaccuracies in knowledge, unreliable or problematic cognitive processes, and other cognitive liabilities.
Myside bias: the tendency of individuals to reason in ways that favor their pre-existing beliefs.
Overconfidence: the tendency to overestimate one's abilities, performance, or chances of success.
Pluralistic ignorance: a process whereby members of a group mistakenly believe that the cognitions and/or behaviors of a majority within the group are systematically different from their own.
Scaffolding: features of an environment that have been designed and implemented to support and facilitate certain types of outcomes, such as collective IH.

of their collectives; they will eschew suboptimal quick-fixes in favor of sustained deliberation, especially on matters of significant complexity and difficulty; they will not be overconfident in their convictions; and they will entertain a variety of viewpoints and aggregate disparately held information.

This is not to say that intellectually humble collectives must be made up of uniformly high-IH members. Groups can be greater (or less) than the sum of their parts. Individuals can attend and respond to intellectual limitations during group endeavors without being strictly focused on their own limitations [21,23]. Similarly, each member can commit to participating in intellectually humbling deliberations while being unaware of some of their own intellectual limitations. Box 1 provides a historical case study that illustrates how collective and individual IH can be distinctly manifested in a specific situation.

In what follows, we argue that individual IH and collective IH are different in important ways. Although most IH-focused interventions target individuals, we think that there are important and overlooked advantages to targeting collective IH. Foremost among them is that collective IH may be more readily attainable than individual IH and that it may be more efficacious, since most of our thinking is done in collective contexts.

Manifesting collective IH

There are reasons to think that IH does not come easily or naturally to most individuals. First, individual intellectual limitations are numerous and often invisible to us; trying to attend to all our limitations is not realistic [44]. Second, to reduce individual cognitive load, we tend to rely on simplifications of complex realities and fail to consider how we might be wrong [45,46]. Third, it is natural for people to take a self-interested view, making them less intellectually humble when reasoning about their own social situations than they are when reasoning about the social situations of others [47]. Furthermore, we tend to recognize biases and motivated reasoning more readily in others than we do in ourselves [23,48–50]. Since collectives are made up of individuals who do not reliably recognize and attend to their intellectual limitations, we might assume that collectives stand little chance of being intellectually humble as well.

Box 1. Case study: contrasting collective and individual IH

The study of the etiology of peptic ulcer disease (PUD) has been used to illustrate various phenomena in social epistemology [60]. Here, we use it to illustrate how collective IH manifests differently from individual IH. Starting in the 19th century, there were two competing theories of PUD, one pointing to excessive acidity and the other pointing to bacterial infection. The bacterial theory was abandoned for several decades during the mid-1900s for a number of reasons, including challenges in identifying the specific ulcer-causing bacteria and a growing emphasis on psychosomatic causes of stomach disturbances [113]. For several decades, the acid theory seemed most plausible and was the predominant focus of research, partly due to erroneous findings suggesting that bacteria could not live in the human stomach [60]. The fact that a small enclave of researchers was unmoved by this influential evidence kept the bacterial theory alive long enough to ultimately be vindicated by the end of the 20th century.

These historical developments in the study of PUD illustrate that the scientific community benefits from scientists being able to identify and challenge the intellectual gaps and mistakes of their peers. While scientists pursuing the acidity theory pointed out major weaknesses in the bacterial theory, their peers developed methodological solutions to improve bacteriological research. In addition, the discovery that the Gram stain used by proponents of the acidity theory to detect bacteria in stomach biopsies was not capable of detecting the relevant bacteria led to the implementation of more appropriate methods of bacterial detection.

These benefits need not, and perhaps could not, be reaped through the widespread manifestation of individual IH. Moving the study of PUD forward did not depend on the scientists attending to the limitations of their own research because their pursuit of opposing theories ensured that they would attend to one another's limitations. We argue that this is one aspect of collective IH. Another is a recognition and ownership of the collective's cognitive efforts. We find this in the community's joint adherence to the norms and methods of scientific inquiry, which scaffold collective IH by facilitating the identification and correction of the errors of its practitioners.

However, this conclusion ignores an important possibility with respect to collective IH. Empirical findings concerning self-other asymmetries suggest that most people have difficulty recognizing and addressing many of their own intellectual limitations but are more adept at recognizing and attending to other peoples' limitations under the right conditions [23,48–50]. These conditions naturally arise in many contexts of collective discussion and deliberation (see below), which suggests that collective IH is often not reducible to the aggregate or average IH of a collective's members. Each member's intellectual limitations (cognitive biases, deficits, and shortcomings) can be checked through dialogue with others. Mutual interactions may humble otherwise arrogant individuals, although they need not do so in order for collectives to appropriately respond to their manifest limitations.

One of the advantages of collective cognition is that it can help overcome the intellectual limitations of its constituent members through a division of cognitive labor, even when these limitations are widespread. A few knowledgeable individuals can remedy pervasive ignorance by sharing what they know [51,52], a few steadfast dissidents can attenuate a widespread bias or oversight by persistently challenging the views of the majority [53–56], and a few numerate members can make up for a largely innumerate membership by taking on roles that put their skills to good use [52,53].

However, there are social dynamics that can interfere with individuals recognizing and attending to the intellectual limitations of one another and their collective. Ironically, these dynamics that can interfere with the manifestation of collective IH can be exacerbated by pervasive tendencies that we might associate with individual IH.

Foremost among these problematic dynamics is the common tendency to reason toward a consensus. Reaching a consensus after all the relevant information and arguments have been aggregated and evaluated is a good thing, but a sustained period of dissent and deliberation can be very important to group outcomes [57–60]. A problem is that the perception of an emerging consensus can prematurely stifle critical deliberation [42,61–63]. As the dominant view proliferates, its proponents become increasingly confident about its accuracy and less attentive to its weaknesses. In extreme cases, group members disregard their own reasoning and align without further deliberation [42]. In turn, discordant information gets ignored and/or downplayed, and intellectual limitations go unrecognized and unaddressed [64–67]. Rather than humbly harnessing its collective resources, such collectives reason like biased, overconfident individuals.

Collectives can sometimes overcome this lack of IH when they contain a few stubborn dissenters. Dissent in the face of a majority is difficult [62] and often requires deep commitment to a group or a belief [68]. But when dissenters challenge the majority view during constructive deliberation, it leads to more creative and critical thinking: more information gets shared, more perspectives get considered, more arguments get articulated and evaluated, more complex reasoning gets sustained, and more novel ideas get entertained [59,66,69–73]. This is the case even when dissenters are few in number and even when they are mistaken [74,75]. Constructive disagreement is especially important when collectives face complex problems that do not have clear solutions [76,77]; it is in these conditions that collective IH is most efficacious.

Importantly, dissenters will not appreciably slow conformity if they are tentative or uncertain. They must be forceful and consistent in their dissent to positively influence the course of collective discussions [78–81]. Maintaining this type of dissent in the face of a disagreeing majority is risky: dissenters are more likely to be challenged and disliked and miss out on the collective knowledge and expertise of the majority [80,82,83]. These considerations can be outweighed when dissenters exhibit epistemic virtues, such as intellectual courage and autonomy.

There are also less virtuous pathways to productive dissent. The results of simulations suggest that beneficial forms of temporary disagreement can be maintained in large deliberating collectives when some dissenting agents manifest one of the following behaviors: (i) are resistant to information that is inconsistent with their beliefs [59,60,84]; (ii) are slow to update their beliefs in the face of discordant evidence [55,85]; and (iii) begin deliberation extraordinarily confident in their beliefs [59,60,86].

Both (i) and (ii) are characteristics of myside bias, that is, the tendency of individuals to reason in ways that favor their pre-existing beliefs, which may be indicative of a lack of IH. The extraordinary confidence in condition (iii) may be warranted but can also be the result of **overconfidence**, especially when dissenters fail to properly countenance the fact that they are in the minority, which constitutes at least a modicum of social evidence that they could be mistaken. This too might indicate a lack of IH.

It should be stressed that the benefits of temporary disagreement cannot be reaped when dissenters manifest more than one of these behaviors or when they manifest any of them in the extreme. Intransigent dissenters lead to polarization and deadlock, even in cases where the evidence is reasonably definitive [55,87–89]. Thus, only select deficits of individual IH can be beneficial to collective deliberations, although they are more consistently deleterious for individuals [9]. As such, collective IH is not reducible to individual IH.

These dynamics can be seen at work in humanity's most successful collective epistemic endeavor: institutional science (Box 2). The project of converging on veridical views of complex topics is exceedingly difficult, even for large, well-informed scientific communities; it often requires more deliberation and information seeking than most scientists can achieve on their own. As such, it requires that scientific communities appropriately respond to their intellectual limitations by efficiently dividing the cognitive labor required to rigorously test each of their candidate theories

Box 2. Collective IH in science

Dunning talks about science as 'an institution with the habits of IH at its core' (see page 265 in [18]). The habits that he emphasizes fall within the Popperian approach to science whereby '…practitioners must design studies and experiments that provide a reasonable chance that their pet theory or hypothesis might fail' (see page 265 in [18]). This approach puts the onus for collective IH on individual scientists in ways that Popper and others recognize as being untenable [56,57,91,114,115]. Given the powerful bias that scientists manifest toward their own theories, he insists that falsification must be a social process that divides the cognitive labor required for severe testing [114]. This insight motivates Robert Merton's norm of organized skepticism, which consists of 'institutional imperatives' (policies, constraints, and incentives) that facilitate the critical scrutiny of scientific claims. Evidence suggests that these scientific norms and institutional practices can attenuate various forms of bias, from theoretical blind spots to ideological commitments [116].

Scientific norms and policies of self-correction have themselves evolved in response to criticism from members of the scientific community. This has manifested itself in advancements in open science that provide important insights about how to foster IH in large institutional collectives. For instance, observable self-correction indicators, including open data, open materials and methods, replications, registered reports, and diversity, facilitate more transparency and critical appraisal within science [117]. The adoption of such institutional imperatives increases the collective IH of scientific groups without requiring that all individual scientists recognize and attend to their own intellectual limitations; indeed, many scientists actively disapprove of these reforms. Open science practices are also fostered by norms and institutional reward structures, like visible badges for engaging in open science practices in scientific journals and in hiring and promotion policies.

Competing scientific theories might be better tested under such conditions when some of their advocates are slow to recognize and redress their intellectual limitations. Stubborn holdouts who are resistant to being humbled by empirical evidence can benefit the scientific community by rigorously developing their own theories and severely testing competing theories [118]. For this sort of severe testing to occur, however, science must adopt and maintain institutional imperatives of transparency and criticism. Moreover, contemporary scientific norms and practices continue to evolve, which has led to the emergence of such practices as intervention tournaments [119–121] and adversarial collaborations [122,123].

[56,90,91]. Simulation results and theoretical arguments converge on the idea that scientific communities are more likely to explore multiple theoretical options and focus on an accurate consensus when they contain a few members whose convictions are insulated by extraordinary confidence or myside bias [26,55,57,87,92,93].

It is incumbent on collectives to design and implement situational scaffolding to attenuate the personal and interpersonal dynamics that threaten the operation of collective IH [21]. In the next section, we discuss the norms, incentives, constraints, and policies that may promote intellectually humble and humbling interactions.

Intellectually humbling environments

When small groups of people engage in discussion, individuals recognize and attend to one another's intellectual limitations if (i) they have some interests in common, such as forming accurate beliefs or making good joint decisions, and (ii) they disagree about something. This happens, for instance, when groups of forecasters discuss political or economic predictions [94], doctors exchange information about diagnoses [95], or jurors deliberate about a verdict [96]. In such cases, groups can achieve collective IH because members care enough to constructively criticize each other's views and accept valid criticisms. This process breaks down in collectives that have misaligned incentives, in which case they will often harshly criticize each other's views but not accept the criticisms (as in a political debate) or misrepresent their own evidence (as when scientists engage in p-hacking) [97]. The process also does not work in collectives that have norms of conformity or lack diversity of thought, as they will not criticize each other's views and thus end up with **pluralistic ignorance** [98] or **group polarization** [99], respectively.

Conditions (i) and (ii) are often satisfied in the course of our everyday lives; we tend to have common interests with the people we talk to, and we usually exchange arguments when we disagree. However, in some contexts (in a large organization or institution, for instance), these conditions are often unmet. In these cases, exchanges of arguments might not occur at all because people agree with one another or do not perceive existing disagreements.

In such cases, leaders can implement scaffolds that protect and promote intellectually humbling interactions [21]. These scaffolds consist of policies, strategies, norms, constraints, role assignments, and incentives that encourage cognitive diversity, broad participation, open criticism, transparency, and accountability. Numerous fields of study have developed interventions that plausibly facilitate these ends. Box 3 outlines several existing interventions from cognitive sciences, organizational psychology, and political science that represent collective IH in action, without having previously been conceptualized or evaluated in terms of collective IH. While implementing these strategies requires broad agreement within the collective, their efficacy in facilitating collective IH does not depend on individuals focusing on their own intellectual limitations. Consequently, facilitating an intellectually humbling environment may be a more efficient way to achieve collective IH than attempting to intervene at the level of individual IH.

Furthermore, when agreeing to participate in a culture of collective IH, individuals could be more likely to manifest IH in their own lives [100]. When individuals identify with an intellectually humble collective, they can come to see IH as an important component of their own identity, a process known as self-stereotyping [101]. They may, in turn, affirm and amplify norms of collective IH that other group members adopt. Members' beliefs about the collective might also be more or less conducive to collective IH. For example, groups that are higher in collective narcissism, most of whose members believe that their group is exceptional and deserving of privileged treatment [102,103], might be lower in collective IH. Collective narcissism might predict reluctance to

Box 3. Methods for scaffolding collective IH

Anonymous balloting: to promote broad participation and the aggregation of disparately held information, collectives can solicit anonymous votes before deliberation begins. The anonymity condition also protects dissenting voices from the social pressure to conform to the majority view.

Norms and systems of accountability: deliberation should take place in conditions where all participants are accountable for their contributions and for collective outcomes. Such conditions prompt greater reflection in individuals [124] and may facilitate constructive criticism and correction between individuals.

Delphi method: to protect and aggregate diverse viewpoints, collectives can solicit anonymous votes/estimates in a series of rounds, with a requirement that the results of each round converge closer to a consensus. This process encourages participants to be responsive to the contributions of others and is most successful when they share the reasons for their votes/estimates [125,126].

Devil's advocate and red teaming: to promote cognitive diversity and critical thinking, individuals can be tasked with challenging majority viewpoints or defending dissenting positions. This can reveal intellectual limitations (biases, oversights, areas of ignorance, etc.) that might otherwise go unnoticed when collectives agree. The devil's advocate strategy is not as effective as genuine dissent [71] and may be more likely to be vigorously taken up when assigned to a team of outsiders (a red team) rather than a single member of the collective. For example, law firms use this strategy when they prepare their cases by engaging in mock trials.

Premortems: instead of retrospectively assessing the reasons that a project has failed (a postmortem), collectives can prospectively imagine that their plan will fail and predict the reasons for its failure (a premortem). Doing so requires that they explicitly consider their intellectual limitations and how they might lead to collective failure [127].

Deliberative polling: deliberative polls have been implemented to generate productive discussions on politically polarizing topics [128]. A random, representative sample of citizens is selected to participate in a series of deliberations about an issue that faces their community. After filling out a questionnaire on the topic, they receive a brief of balanced information and are then randomly assigned to small discussion groups that are led by trained moderators. Each group generates a list of questions to ask a panel of partisan experts and policymakers during a plenary session, after which participants fill out a follow-up questionnaire.

acknowledge limitations and intolerance of criticism, especially stemming from outside the collective. Nevertheless, we suggest that IH is generally more likely to trickle down from collectives to their members than to scale up from individuals to collectives.

Finally, scaffolds that target collective IH apply equally to everyone within the group, regardless of their individual IH. As a result, a culture of collective IH can surpass and outlast the time-bound leadership and membership of a collective. In open science, for example, individual scientists need not personally value transparency but must agree to operate within the open science infrastructure to maintain standing in the community, which effectively achieves the same end (e.g., they might be required to share data as a condition for publication). This is also how collective IH might spread to (and benefit) future group members.

Future directions

The empirical study of collective IH has yet to begin in earnest. To promote research in this area, we propose several priorities for expanding theory and launching empirical examinations of collective IH (see Outstanding questions).

Examining the dynamics of collective IH in diverse collectives

The size, structure, and power dynamics of a collective likely affect how members interact [104]. The processes that promote collective IH may differ radically across different types of collectives. Another related question is how new members are inducted into a culture of collective IH; through which processes of identification, enculturation, or education do the intellectually humble collective reproduce itself over time? Attending to the dynamics by which intellectually humble

collectives emerge and are maintained, through careful naturalistic observation, computer simulation, and experimentation, will be key to formulating a thorough account of the processes that produce collective IH.

Evaluating the scaffolds supporting collective IH

Our framework emphasizes the need for environmental scaffolding in creating the conditions for collective IH. Work is needed to evaluate what institutional rules, structures, norms, practices, and technologies best promote collective IH in different contexts and collectives. We suspect that such discoveries will dovetail with research on success in scientific communities and with the conditions for successful democratic deliberation and decision-making [21]. This literature considers community features related to collective IH, like democratic norms that allow minority opinions to be voiced and supported [91], the inclusion of diverse voices that will bring dissenting opinions to bear in deliberation processes [56], and ways of sustaining efficient disagreements without compromising mutual trust and tolerance [105]. It is also worth noting that some scaffolds might not produce their intended consequences, as seen in cultures of radical honesty, which may have backfiring effects. Cultural differences will also be relevant to the efficacy of different scaffolds. Most studies of individual IH use US samples, with some recent exceptions [8,11,106–108], lending little insight into how different cultural norms interact with IH. Further work is needed to examine how culture might be leveraged to cultivate collective IH.

Measuring collective IH and its relationship to individual IH

Advancing the study of collective IH will require ways of accurately measuring collective IH. We suggest two approaches. The first is to assess individuals' tendencies to recognize one another's limitations and their commitment to creating and maintaining intellectually humbling environments. This approach likely side-steps some of the challenges inherent to self-reported individual IH [109,110]. It will be important to build measures on the basis of a clear conceptualization of collective IH rather than merely mimicking scales of individual IH. Successful measures are likely to be highly contextualized and sensitive to the ecological constraints in which the persons targeted are operating [22,110]. In this research program, the reducibility of collective IH to classical individual IH should be investigated. We hypothesize that such a reduction will not be complete, as is the case of collective IQ [40].

The second approach is to develop measures of institutional or organizational cultures of IH. Such measures might assess the implementation and efficacy of alternative scaffolds that target collective IH, including norms, incentives, constraints, etc. Such measures can also directly attend to the conditions of collective IH, such as network structure, cognitive diversity, broad participation, open criticism, transparency, and accountability. The field might borrow techniques from the collective intelligence and group decision-making literatures, which assess some of these features [111,112]. Doing so will necessitate paying attention to how different collectives are structured and borrowing techniques from the social and cognitive sciences.

Evaluating the outcomes of collective IH

We believe that collectives that manifest IH will be more reflective, more open to diverse points of view, more effective in aggregating disparately held information, more thorough in deliberations, and more likely to avoid premature consensus. These benefits mirror those associated with individual IH. For example, we expect intellectually humbler collectives to reach more accurate conclusions, make better decisions [112], exhibit greater resistance to misinformation, benefit from being more welcoming and inclusive of diverse views, and learn more. Research is needed to evaluate these hypotheses.

Finally, there may be areas where facilitating collective IH conflicts with other best practices, such as decision-making efficiency. Members recognizing and attending to intellectual limitations can slow the progress of a collective toward reaching its goals. By contrast, a widespread commitment to the norms of intellectually humbling interaction may facilitate less rancorous disagreements, thereby saving time and energy in the face of opposing views and bolstering trust and cohesion for future efforts. These open questions and potential contraindications of collective IH should also be examined.

Outstanding questions

Which environmental scaffolds (rules, procedures, structures, norms, practices, technologies, etc.) best nurture and facilitate collective IH and in what contexts?

How can collective IH be measured effectively?

What are the effects, both positive and negative, of collective IH?

Is IH more readily achievable in collectives than in individuals?

What is the relationship between collective IH and individual IH?

Further developing the applications of collective IH

In this paper, we have focused on how collectives gather data and reason to reach a decision or judgment. However, collective IH is also likely relevant to other aspects of the operations of collectives. For example, intellectually humble collectives might be better at recognizing when a task is too complex or difficult to handle directly, thus calling for its analysis into component parts and a corresponding division of labor. Relatedly, it is worth exploring how collective IH relates to the assignment of roles within a collective, such as which individuals are selected to make decisions on its behalf. Finally, more work needs to be done on how collectives evaluate the short- and long-term effectiveness of their decisions and the role of collective IH in these processes.

Concluding remarks

Despite numerous calls to study IH on a collective level, a framework for doing so has been lacking. We offer a conceptualization of collective IH and identify connections to existing ideas within philosophy and the cognitive and behavioral sciences that can be used in the conceptualization and application of collective IH. We also offer directions for research on collective IH.

The study of collective IH represents an important opportunity for social and cognitive scientists. Studying collective IH is perhaps even more important than studying individual IH, given that most of our thinking occurs in collectivist contexts. There is also reason to believe that IH is more readily achievable and efficacious in collectives than in individuals, given that humans tend to be more adept at recognizing and attending to the intellectual limitations of others than their own. This tendency can be harnessed to yield collective IH, particularly in cognitively diverse collectives whose constituents have different weaknesses that can be overcome through sustained interactions.

Collective IH also involves the tendency of collectives to recognize and attend to the limitations of their collective cognitive efforts. Such limitations may be more difficult to recognize precisely because they are shared. Yet, the environmental conditions that promote recognition of intellectual limitations in individuals are also likely to promote recognition of collective-level intellectual limitations. Thus, collective IH does not require heroic IH efforts from individuals but commitments from individuals within a collective to foster environments that promote constructive criticism, frank debate, productive dissent, and intellectual transparency.

Declaration of interests

No interests are declared.

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