

1 Shared Responsibility in Collective Decisions

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4 **Marwa El Zein^{1*}, Bahador Bahrami^{2,3} and Ralph Hertwig³**

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6 ¹ Institute of Cognitive Neuroscience, University College London, United Kingdom

7 ² Faculty of Psychology and Educational Sciences, Ludwig Maximilian University,

8 Munich, Germany

9 ³ Center for Adaptive Rationality, Max Planck Institute for Human Development,

10 Berlin, Germany

11

12 *Correspondence: marwaelzein@gmail.com (M. El Zein)

13 Abstract

14 Research investigating collective decision making has focused primarily on the
15 improvement of accuracy in collective decisions and less on the motives that drive
16 individuals to make these decisions. We argue that a strong but neglected motive for
17 making collective decisions is minimizing the material and psychological burden of
18 an individual's responsibility. Making difficult decisions with others shields individuals
19 from the consequences of negative outcomes by reducing regret, punishment, and
20 stress. Considering shared responsibility as a another key motivation to join groups
21 helps understand behaviors with societal implications such as political voting,
22 committing norm violations, predicting natural disasters, and making health-related
23 decisions.

24 Main text

25 People make many decisions collectively; these range from mundane choices such
26 as where to have dinner to fateful ones such as how to vote in an important election
27 or referendum. Collective decisions are also made by other social species, such as
28 bees¹, ants¹, and fish². These species make group decisions by mechanisms similar
29 to voting and consensus^{1,2}. In this Perspective, however, we focus on human
30 collective decision making. Previous research in this field has concentrated on
31 whether the *accuracy* of collective decisions surpasses that of individual decisions,
32 and under which conditions this “wisdom of the crowd” can be harnessed³⁻¹³. Here,
33 we shift the focus to a key issue that has received little attention to date: *Why* do
34 individuals engage in collective decision-making behaviors in the first place?

35 One answer to this question is that collective decisions are often *obligatory*:
36 numerous endeavors are only possible when people coordinate their efforts and act
37 collectively (**Figure 1A**). Examples of this type of collective behavior include being
38 part of a reproducing couple, hunting a large and dangerous prey¹⁴, and
39 manufacturing a product that requires various specialized skills (although belonging
40 to such a collective does not imply that, by necessity and across cultures¹⁵, decision
41 making will always be participatory and collective). In these latter cases, individual
42 members have no choice but to abide by the collective norm. However, there is
43 another class of situations that arise when individuals with the same goal or
44 incentives *voluntarily* choose to take a collective decision (**Figure 1B**). Examples of
45 this type of collective behavior include friends starting a business, groups of doctors
46 making medical decisions, and panels of experts predicting a financial crisis. Our
47 focus is on this latter class of situations, in which collective decisions are voluntary.

48

49 **Why Voluntarily Join Collectives**

50 For an individual, achieving admission to a group can be costly. Orchestrating a joint
51 decision can exact costs such as loss of autonomy and time, and/or coordination
52 costs^{16,17}. Given these potentially substantial costs, what makes the collective
53 approach to making decisions attractive? Motives for joining collectives can relate to
54 the decision process itself or to its anticipated positive/negative *outcomes* (**Figure 1**).

55 We identify three main categories of motives for voluntary collective decisions
56 (coded as underlined, italic, and bold in **Figure 1**). The first is improving outcomes by
57 joining forces (underlined). Here, individuals can be driven by combining their efforts
58 during the decision process (dividing their labor or sharing necessary materials,
59 **Figure 1a, Effort**), increasing accuracy, acquiring veridical representations of
60 reality¹⁸, obtaining higher rewards¹⁹, and learning from others^{20,21} (i.e., pooling
61 intelligence to reach positive outcomes; **Figure 1b, Pooling intelligence**). These
62 motives are not self-evident. The saying that “two heads are better than one” vies
63 with contradictory maxims, such as “too many cooks spoil the broth.” Even in his
64 legendary demonstration of collective wisdom, Francis Galton²² was surprised that
65 the “vox populi” outperformed the individuals’ estimates. Likewise, individuals
66 underestimate the improvement achieved in reasoning tasks when they act as a
67 group²³.

68 A second important category of motives for joining groups relates to social
69 and normative needs, i.e., feeling included in a group or society and fulfilling needs
70 for fairness (shown in italic in **Figure 1**). Social interactions can be intrinsically
71 rewarding²⁴, and being a member of a group can help to maintain a positive self-
72 concept through positive shared social identity^{25–27} (**Figure 1a, *social inclusion***).
73 Furthermore, people have various communal and normative needs: they care about

74 emotional identification, moral values associated with cooperation¹⁹, and procedural
75 justice²⁸ (concern for fairness; **Figure 1a**, *Fairness*).

76 However, there is another, underappreciated and under-investigated third
77 category of motives for joining groups: sharing responsibility for decisions (shown in
78 bold in **Figure 1**). We argue that shared responsibility plays an important role in
79 motivating collective decision making because its benefits are consistent and
80 reliable, even in the absence of improved outcomes. In the next three sections of the
81 perspective, we advance this thesis in three steps: (1) We provide evidence that
82 responsibility is indeed shared in collective behaviors, allowing individuals to claim
83 credit for positive outcomes (**Figure 1b**, **Credit**) while avoiding blame for negative
84 outcomes. (2) We identify conditions and contexts under which sharing responsibility
85 with others can benefit the individual. (3) We argue that sharing responsibility
86 benefits the individual by decreasing the risk of internal sanctioning (**regret**), external
87 sanctioning (**punishment**) and **stress** (**Figure 1c**). Because few empirical studies
88 have directly addressed the motives underlying collective decision-making we draw
89 on evidence is, by necessity, predominantly circumstantial. We believe, however,
90 that the evidence we present from studies on responsibility, agency, group
91 behaviors, and delegation supports our thesis and highlights the relevance of this
92 previously neglected facet of group decisions. Let us also mention that we base our
93 argument on studies not only of collectives but also of individual behavior, as the
94 latter shed light on the individual's perspective when making the decision to join a
95 group. We hope that the framework we propose to systematize the motives
96 underlying collective decision-making will encourage researchers across disciplines
97 to directly address the central question driving this investigation: Why do people
98 voluntarily join collectives?

100 **Decreased Responsibility in Groups**

101 The thesis that individuals make collective decisions for sharing responsibility
102 involves a prerequisite: that individuals feel less responsibility and relatedly, less
103 agency, when they are in the group as compared to alone. But do they?

104

105 **Diffusion of Responsibility in Groups**

106 Early studies on diffusion of responsibility showed that people feel less responsible
107 when performing an action as a group than when acting alone^{29–35}. These pioneering
108 works demonstrated that when individual contributions are ambiguous and group
109 members are not assigned particular roles (such as “leader”), attributions of
110 responsibility follow a self-serving rule: individuals tend to claim more credit for
111 successes (**Figure 1b, credit**) and avoid responsibility for failures^{32–35}. Research has
112 shown that the decreased sense of responsibility in groups can promote adverse and
113 undesirable behaviors³⁶, such as free-riding^{1,37–39}, groupthink⁴⁰, social loafing⁴¹,
114 abstaining in elections⁴², inaction in emergency situations (known as the bystander
115 effect^{43–45}). Such behaviors may emerge because individuals in groups act as if they
116 delegated responsibility and agency to others^{1,37}. As these behaviors illustrate, the
117 individual benefits of shared responsibility do not necessarily coincide with the
118 collective good: while the individual ends up with a better outcome or avoids effortful
119 actions, the collective outcome is hindered (less cooperation, worse decisions). In a
120 similar way, the individual benefit of improving accuracy and rewards can be
121 disconnected from the collective improvement of accuracy: Lorenz and colleagues⁴⁶
122 found that the communication of opinions between members of a group reduces the
123 diversity of opinion, rendering the *collective* opinion (i.e., the average of the
124 individual opinions) less accurate. However, a reanalysis of the same data⁴⁷ showed

125 that *individual* participants' accuracy and rewards were, on average, improved by
126 converging towards the others' opinion. The discrepancy shows how individual- and
127 group-level outcomes may not converge⁴⁸. Importantly, this divergence highlights
128 how engaging in socially interactive, collective decision may prove useful for
129 individuals without benefiting the group⁴⁸.

130

131 **Modulated Sense of Agency in Groups**

132 The sense of agency is a subject of growing attention in cognitive science⁴⁹. A
133 person's sense of agency⁴⁹ refers to their perceived control over their actions and,
134 ultimately, the world around them. It has been described as a "mental and neural
135 state of cardinal importance in human civilization" that "underpins the concept of
136 responsibility"⁴⁹. Experimental evidence shows that a reduced feeling of
137 responsibility is associated with a reduced sense of agency, offering further support
138 for an intimate link between agency and responsibility⁵⁰.

139 Previous studies suggest that acting in a group decreases the sense of
140 *individual* agency and responsibility for the collective outcome. Even conditions such
141 as merely being in the presence of another agent who does not causally contribute
142 to the outcome⁵¹, receiving orders from others⁵⁰, and performing actions with
143 others⁵² decreases an individual's sense of agency. By the same token, people
144 report feeling less responsible for harming others if they are acting on orders⁵⁰ and
145 less responsible for probabilistic outcomes if they gamble collectively rather than
146 individually^{53,54}. In addition, acting in cooperation with others can foster a sense of
147 *joint* agency via the emergence of a "we-mode," which consists in a shift from self-
148 agency to we-agency in collective actions^{52,55-60}. The literature on joint agency
149 shows that entering this we-mode is context dependent: it depends on factors such

150 as the structure and scale of a joint action⁵⁵, the distribution of roles^{52,60}, and the
151 capacity to make joint predictions⁵⁷. Consequently, individuals in a group may not
152 always feel as if they are acting as a unified group and, by extension, as if they share
153 responsibility. But even if individuals do not enter the we-mode during an action or
154 decision, they can still retrospectively hold others in the group responsible for
155 undesirable outcomes.

156

157 **When it is Beneficial to Share Responsibility**

158 When do people decide to join groups in order to share responsibility? This is not a
159 trivial question, as being in a group commonly exacts the cost of giving up some
160 autonomy—and people value their autonomy as, for instance, the following findings
161 demonstrate. Humans seek it as a reward in its own right⁶¹, similar to food or mating
162 opportunities. Even in rodents, autonomy fosters resilience⁶². Likewise, civil servants
163 who have more control over their job are more resistant to ischemic heart disease⁶³.
164 Moreover, people seem to insist on making decisions for themselves even when this
165 autonomy comes with emotional costs^{64,65}. In contrast, research on delegation and
166 advice seeking has shown that people prefer to give up their autonomy or parts of it
167 when faced with difficult choices^{66,67}. They do so by procrastinating^{68–71}, opting for
168 the default option^{72,73}, or delegating the choice to someone else^{67,74}. Similarly, every
169 time individuals join a group, they relinquish at least some of their autonomy.

170 So when and why do individuals give up some of their autonomy—along with
171 its tangible and intangible benefits—to join collectives? Embedding oneself in a
172 collective structure may be a good compromise between retaining full autonomy and
173 thus responsibility (which, if the outcome is negative, could be very costly) and
174 surrendering all autonomy, thereby renouncing responsibility. In other words,

175 collective decisions preserve some autonomy while offering protection when things
176 go awry and blame is apportioned.

177 Joining collectives to share responsibility—at the price of having less control—
178 can be useful in the following two conditions. First, when individuals face choices
179 whose outcomes are uncertain and potentially detrimental. Blowing the whistle on a
180 powerful individual's misconduct or investing in a new business are real-life
181 examples of uncertainty-ridden choices that can have dramatic consequences. In
182 many such cases, the consequences of solitary versus collective decisions can be
183 asymmetric: a single negative report on a powerful individual's behavior can destroy
184 the whistleblower's career and livelihood, whereas a cluster of such reports can
185 validate the complaint, increase the chance of change, and reduce the risk of
186 individual-specific retribution. In group decision making, individual members tend to
187 defer risky decisions to other members of the group, a kind of responsibility
188 aversion⁷⁵. When faced with important decisions that run a high risk of errors, people
189 voluntarily seek advice to share responsibility for their judgments⁷⁶. More generally,
190 descriptive norms (what most other people do or say they do⁷⁷) can be used to justify
191 choices retrospectively⁷⁸. Descriptive norms allow decision makers to attribute some
192 of the responsibility to others, thereby protecting themselves from the potential
193 consequences of errors.

194 Second, it may make sense to join groups to share responsibility when the
195 outcome of a decision is not uncertain, but rather when the momentous potential
196 impact of the decision may have detrimental consequences for those who took it
197 individually. For example, in the admittedly extreme case of execution by firing
198 squad, the squad members are usually instructed to fire simultaneously, making
199 impossible to know who fired the lethal shot and is, therefore, ultimately responsible

200 for the condemned person's death. Also, even when the outcome is predictable, the
201 process of making the decision itself can be emotionally distressing, as in the case of
202 end-of-life medical decisions made by surrogate decision makers⁷⁹. Sharing
203 responsibility for such decisions can be beneficial for individuals as it might help
204 mitigate the associated distress. Indeed, people facing tragic choices, such as
205 parents deciding whether to discontinue their baby's life support, have a weakened
206 desire for decision autonomy⁸⁰; however, they hesitate to completely relinquish their
207 option to choose. As suggested before, a collective decision could be a good way to
208 combine conflicting objectives: sharing responsibility with others allows an individual
209 to take less responsibility for the decision outcome without surrendering their
210 autonomy altogether. In contrast with the decreased desire for autonomy for stressful
211 choices⁸⁰, other studies show that people prefer autonomy over delegation even if
212 the final experience is more negative^{64,65}. Interestingly, the latter studies examined
213 consumers' choices about food options, which involved little uncertainty or stress,
214 and thus did not fall into either of the conditions we describe. This context-
215 dependency of the preference to forgo autonomy reinforces our claim that people will
216 choose to share responsibility only under specific conditions.

217 Our discussion of motives for engaging in collective decisions focuses on the
218 perspective of the individual decision maker and does not consider how an outcome
219 and its effects may or may not be shared between the individual and the collective.
220 Various allocations are possible: (1) The outcome may affect only the individual,
221 such as when an investor heeds the advice of an advisory panel; (2) the outcome
222 may affect both the individual and the collective, such as when members of a family
223 invest in a property together; and (3) the outcome may only affect the decision
224 maker(s) indirectly by affecting their reputation, for example, such as when a group

225 of doctors reach a decision about a patient’s diagnosis and treatment. Without
226 wanting to underestimate the differences between these scenarios, we suggest that,
227 from the individual’s point of view, they all represent situations in which being a
228 member of a group decreases the individual responsibility for a decision’s outcome.
229

230 **Why it is Beneficial to Share Responsibility**

231 How does shared responsibility benefit individual group members in the conditions
232 outlined in the previous section: (i) when outcomes are uncertain and potentially
233 detrimental (ii) the decision process and/or the certain outcome are emotionally
234 distressing? In the former condition, the costs of errors can be high. These costs
235 may be psychological (e.g., regret) or material (e.g., loss of money or reputation);
236 they can be self-imposed or imposed by others. Sharing responsibility in collective
237 decisions can protect against these internal and external costs. In the latter
238 condition, sharing responsibility can help mitigate this emotional toll. In all these
239 cases, individual group members benefit from the collective structure independently
240 of any potential improvements in outcome. This property constitutes the robust
241 benefit of sharing responsibility in collective decision making. Dividing and
242 distributing responsibility thus serves as a kind of an “insurance policy,” similar to
243 diversification in risk management. In social animals, a comparable “insurance
244 mechanism” is observable in the “dilution effect”: animals congregate in groups to
245 protect themselves from predators, thus “diluting” the risk of being attacked⁸¹.

246 We discussed that individuals do indeed feel less responsibility and agency in
247 a group setting. If the decision outcome is successful, the difficulty of responsibility
248 attribution in a group structure allows individuals to claim credit for this outcome
249 (**Figure 1b, credit**). We next turn to—admittedly circumstantial—evidence that

250 suggests that people can reap tangible benefits from sharing responsibility in terms
251 of attenuation of regret, punishment, and stress in the case of a negative outcome
252 (Figure 1c).

253

254 **Reducing Internal Self-Sanctioning**

255 Regret is a common emotion that strongly influences decision making⁸². People
256 experience regret when thinking about counterfactual, preferable outcomes that
257 could have occurred had another choice been made^{83,84}. Studies on the link between
258 regret and responsibility suggest that regret is conditional on feeling responsible for
259 an outcome⁸⁵ and even that feeling responsible for a decision or an action is the
260 “constitutive element of regret”⁸⁶ (but see debate on this issue^{85,87–89}). The availability
261 of counterfactual outcomes increases the individual sense of agency⁹⁰, and the
262 feeling of responsibility is conditional on an awareness that one could have decided
263 differently⁹¹. Being part of a group distributes the responsibility for decision outcomes
264 among more than one individual; consequently, the members of groups are likely to
265 feel less regret than if they had made the same decision alone. In fact, subjective
266 ratings of both responsibility and regret are lower in the wake of majority votes⁵⁴.
267 Moreover, people are prone to anticipate regret and do their best to avoid it by
268 making regret-minimizing choices^{66,92–95}. Consistent with our thesis, anticipated
269 regret leads people to delegate difficult decisions to others⁶⁷, suggesting that making
270 collective decisions may be one way to regulate and reduce both anticipated and
271 experienced regret.

272

273 **Reducing External Sanctioning**

274 Formal and informal institutions of justice that enforce norms and punish violations of
275 norms are crucial for individual and collective welfare. Humans are even willing to
276 bear personal costs to punish others who violate norms⁹⁶. Punishment can also be
277 social, such as loss of reputation or ostracism. The Chinese government has even
278 implemented a social credit system in which citizens' behavior and trustworthiness is
279 measured, and when found lacking on the governmental benchmarks results in a
280 lowering of citizens' scores⁹⁷. A critical factor in determining whether an individual
281 should be punished for an action is not only whether they were the agent of that
282 action but also whether they were responsible for it⁹¹. There is evidence suggesting
283 that responsibility deferral is a strong motive for delegation of a decision to another
284 person as it protects against punishment⁹⁸. The collective sharing of responsibility for
285 a decision's detrimental outcome is likely to result in collective punishment. Yet how
286 a collective can be held responsible is a much debated question in moral philosophy,
287 given that a collective lacks the psychological capacities attributed to an individual⁹⁹.
288 As long as the penalty for a collective act is distributed across agents, it is likely to be
289 less severe than for a "solo offender" perpetrating the same act. The difficulty of
290 determining who did what is also likely to attenuate punishment in a group.
291 Identifying an individual's personal contribution to a deed is essential in ensuring that
292 crime and punishment are proportional, a cornerstone of any fair legal system¹⁰⁰.

293 Although indirect, there is some evidence that collectives are held less
294 responsible than individuals for harmful or unfair acts and therefore might be
295 punished less harshly. For instance, people in a group display free-riding
296 behaviors^{38,39}, possibly because they think they are more likely to get away with it in
297 a group than as individuals. A group is judged less responsible¹⁰¹ and punished less

298 severely¹⁰² if it is perceived as consisting of a collection of distinct agents (low-
299 cohesive group) than as a unified agent (high-cohesive group).

300 The “insurance policy” of becoming part of a group is, of course, not fail-safe.
301 Whether or not responsibility is attributed to individuals in a group depends on
302 several factors^{31,103–107}: the status of the individual (e.g., explicit leader)^{31,32,106}, the
303 contribution of the individual to both actual and counterfactual outcomes¹⁰⁷, the order
304 of contributions (e.g., whether the individual was the last person to act)¹⁰³, and the
305 extent to which contributions were pivotal¹⁰⁵. If the group structure is sufficiently
306 transparent, differential responsibility attributions are possible. In such cases, some
307 or all of the protection bestowed by group membership is annulled. However, as long
308 as a lack of transparency guarantees that there is “no soul to damn, no body to
309 kick”¹⁰⁸, responsibility and blame cannot be assigned to individuals.

310 The issue of how to hold a collective responsible for harmful acts is highly
311 relevant to criminal justice. For example, proponents of the joint enterprise doctrine
312 applied in England and Wales^{109,110} argue that any person involved in a crime, even
313 if they did not actually commit it, is just as responsible as the person who did—and
314 that they are to be punished just as severely. The heated discussion around this
315 long-contested legal precedent highlights the fact that it is much harder to know who
316 to blame when several people are involved. The problems inherent in attributing
317 individual responsibility to members of a group, and the associated weakening of the
318 deterrent function of potential punishment, may help to explain why collective
319 protests sometimes culminate in unexpected levels of violence (e.g., France’s recent
320 “yellow vest” protests¹¹¹).

321

322 **Mitigating Stress**

323 Besides buffering against regret and punishment in situations where the outcome is
324 uncertain, collective distribution of responsibility can be beneficial in situations where
325 the outcome is predictable but emotionally distressing. For instance, it can help to
326 mitigate the stress associated with thorny choices that require difficult trade-offs¹¹² or
327 result in tragic outcomes⁸⁰. When faced with choices associated with grave risks,
328 such as whether to prescribe a drug that could cause a fatal adverse reaction⁷⁴,
329 people will be more likely to procrastinate and defer responsibility to others if they
330 are held accountable for their decision. Sharing responsibility in order to mitigate
331 stress is therefore particularly relevant in the domain of medical decision making,
332 when people need to make decisions on behalf of others. Examples include parents
333 having to decide whether to discontinue life support for a terminally ill child⁸⁰ or
334 family member surrogates making treatment decisions for relatives incapacitated by
335 life-threatening conditions¹¹³. In the case of end-of-life decisions, both patients and
336 surrogates much prefer shared surrogate decision making among family members to
337 other forms of decision making (with the sole exception of patient-designated
338 surrogates)^{113,114}. This finding is consistent with our hypothesis that shared
339 responsibility can buffer against the psychological distress of making these difficult
340 decisions by minimizing the burden of individual responsibility. It is also likely the
341 reason why it has been suggested that pooling expert opinions on emergency
342 situations (e.g., predicting the outbreak of a volcano) would not overburden a single
343 expert with the responsibility for making a potentially highly consequential
344 forecast¹¹⁵.

345

346 **Conclusion**

347 To date, research on collective decision making has focused primarily on the
348 potential gains in accuracy that are obtained from collective (rather than individual)
349 decisions. We believe that this focus has both diverted researchers from asking
350 what motivates people to join groups in the first place and largely ignored other,
351 more reliable and tangible, benefits of collective decision making. Drawing on
352 evidence and concepts from psychology, behavioral economics, cognitive science,
353 and philosophy of law, we suggest that individuals engage in collective decision
354 making for at least two additional categories of motives: minimizing sanctioning and
355 reducing emotional distress. First, they can share responsibility for uncertain and
356 potentially detrimental outcomes, thus minimizing post-decisional regret (internal
357 sanctioning) and punishment (external sanctioning). Second, they can share the
358 emotional distress caused by the process of making grave decisions and
359 experiencing their predictable outcomes.

360 Issues of regret, responsibility, and altruistic punishment are relevant across a
361 wide range of societal domains, including medicine, law, and business. It remains an
362 open and crucial question how different motives (e.g., pooling intelligence, sharing
363 responsibility for negative outcomes, and social inclusion; **Figure 1**) interact in
364 prompting people to engage in collective decision-making behaviors. We hope that
365 recognizing the motives for collective decision making (beyond accuracy gains and
366 obligatory collective decisions) will foster a more comprehensive understanding of
367 the conditions under which collective decision making is preferable to individual
368 decision making—in other words, that it will help to determine the ecological
369 rationality of collective intelligence¹¹⁶.

370

371 References

- 372 1. Kameda, T., Wisdom, T., Toyokawa, W. & Inukai, K. Is consensus-seeking unique to
373 humans? A selective review of animal group decision-making and its implications for (human)
374 social psychology. *Group Process. Intergroup Relat.* **15**, 673–689 (2012).
- 375 2. Sumpter, D., Krause, J., James, R., Couzin, I.D., Ward., A. Consensus Decision Making
376 by Fish. *Curr. Biol.* **22**, 1773–1777 (2008).
- 377 3. Surowiecki, J. *The Wisdom of Crowds: Why the Many Are Smarter Than the Few.*
378 (Abacus, 2005).
- 379 4. Sunstein, C. R. & Hastie, R. *Wiser: Getting Beyond Groupthink to Make Groups*
380 *Smarter.* (Harvard Business Press, 2015).
- 381 5. Bahrami, B. *et al.* What failure in collective decision-making tells us about
382 metacognition. *Philos. Trans. R. Soc. Lond. B Biol. Sci.* **367**, 1350–1365 (2012).
- 383 6. Bang, D. & Frith, C. D. Making better decisions in groups. *R. Soc. Open Sci.* **4**, 170193
384 (2017).
- 385 7. Koriat, A. When Are Two Heads Better than One and Why? *Science* **336**, 360–362
386 (2012).
- 387 8. Mahmoodi, A. *et al.* Equality bias impairs collective decision-making across cultures.
388 *Proc. Natl. Acad. Sci.* **112**, 3835–3840 (2015).
- 389 9. Bahrami, B. *et al.* Optimally Interacting Minds. *Science* **329**, 1081–1085 (2010).
- 390 10. Kurvers, R. H. J. M. *et al.* Boosting medical diagnostics by pooling independent
391 judgments. *Proc. Natl. Acad. Sci.* **113**, 8777–8782 (2016).
- 392 11. Prelec, D., Seung, H. S. & McCoy, J. A solution to the single-question crowd wisdom
393 problem. *Nature* **541**, 532–535 (2017).
- 394 12. Navajas, J., Niella, T., Garbulsky, G., Bahrami, B. & Sigman, M. Aggregated
395 knowledge from a small number of debates outperforms the wisdom of large crowds. *Nat.*
396 *Hum. Behav.* **2**, 126–132 (2018).
- 397 13. Herzog, S. M., Litvinova, A., Yahosseini, K. S., Tump, A. N., & Kurvers, R. H. J. M. The
398 ecological rationality of the wisdom of crowds (in press). In R. Hertwig, T. J. Pleskac, T.
399 Pachur, & The Center for Adaptive Rationality, Taming uncertainty. Cambridge, MA: MIT
400 Press
- 401 14. Packer, C. & Ruttan, L. The Evolution of Cooperative Hunting. *Am. Nat.* **132**, 159–198
402 (1988).
- 403 15. LeFebvre, R. & Franke, V. Culture Matters: Individualism vs. Collectivism in Conflict
404 Decision-Making. *Societies* **3**, 128–146 (2013).
- 405 16. Becker, G. S. & Murphy, K. M. The Division of Labor, Coordination Costs, and
406 Knowledge. *Q. J. Econ.* **107**, 1137–1160 (1992).
- 407 17. Battalio, R., Samuelson, L. & Huyck, J. V. Optimization Incentives and Coordination
408 Failure in Laboratory Stag Hunt Games. *Econometrica* **69**, 749–764 (2001).
- 409 18. Toelch, U. & Dolan, R. J. Informational and Normative Influences in Conformity from a
410 Neurocomputational Perspective. *Trends Cogn. Sci.* **19**, 579–589 (2015).
- 411 19. Tyler, T. R. *Why People Cooperate: The Role of Social Motivations.* (Princeton
412 University Press, 2011).

- 413 20. Hoppitt, W. & Laland, K. N. *Social Learning: An Introduction to Mechanisms, Methods,*
414 *and Models.* (Princeton University Press, 2013).
- 415 21. Heyes, C. What's social about social learning? *J. Comp. Psychol. Wash. DC* 1983 **126**,
416 193–202 (2012).
- 417 22. Galton, F. Vox Populi. *Nature* **75**, 450–451 (1907).
- 418 23. Mercier, H., Trouche, E., Yama, H., Heintz, C. & Giroto, V. Experts and laymen grossly
419 underestimate the benefits of argumentation for reasoning. *Think. Reason.* **21**, 341–355
420 (2015).
- 421 24. Pfeiffer, U. J. *et al.* Why we interact: On the functional role of the striatum in the
422 subjective experience of social interaction. *NeuroImage* **101**, 124–137 (2014).
- 423 25. Tajfel, H. & Turner, J. C. *The Social Identity Theory of Intergroup Behavior.*
424 (Psychology Press, 2004).
- 425 26. Robbins, J. M. & Krueger, J. I. Social Projection to Ingroups and Outgroups: A Review
426 and Meta-Analysis. *Personal. Soc. Psychol. Rev.* **9**, 32–47 (2005).
- 427 27. Stevens, M. *et al.* Leaders promote attendance in sport and exercise sessions by
428 fostering social identity. *Scand. J. Med. Sci. Sports* DOI:10.1111/sms.13217 (2018)
- 429 28. Tyler, T. R. Social justice. in *APA handbook of personality and social psychology,*
430 *Volume 2: Group processes.* 95–122 (American Psychological Association, 2015).
- 431 29. Darley, J. M. & Latane, B. Bystander intervention in emergencies: Diffusion of
432 responsibility. *J. Pers. Soc. Psychol.* **8**, 377–383 (1968).
- 433 30. Guerin, B. Diffusion of Responsibility. in *The Encyclopedia of Peace Psychology*
434 (Blackwell Publishing Ltd, 2011).
- 435 31. Forsyth, D. R., Zyzniewski, L. E. & Giammanco, C. A. Responsibility Diffusion in
436 Cooperative Collectives. *Pers. Soc. Psychol. Bull.* **28**, 54–65 (2002).
- 437 32. Caine, B. T. & Schlenker, B. R. Role Position and Group Performance as Determinants
438 of Egotistical Perceptions in Cooperative Groups. *J. Psychol.* **101**, 149–156 (1979).
- 439 33. Forsyth, D. R. & Schlenker, B. R. Attributing the causes of group performance: Effects
440 of performance quality, task importance, and future testing. *J. Pers.* **45**, 220–236 (1977).
- 441 34. Leary, M. R. & Forsyth, D. R. Attributions of responsibility for collective endeavors. in
442 *Group processes* 167–188 (Sage Publications, Inc, 1987).
- 443 35. Miller, R. S. & Schlenker, B. R. Egotism in Group Members: Public and Private
444 Attributions of Responsibility for Group Performance. *Soc. Psychol. Q.* **48**, 85–89 (1985).
- 445 36. Baumeister, R. F., Ainsworth, S. E. & Vohs, K. D. Are groups more or less than the
446 sum of their members? The moderating role of individual identification. *Behav. Brain Sci.* **39**,
447 (2016).
- 448 37. Feng, C. *et al.* Diffusion of responsibility attenuates altruistic punishment: A functional
449 magnetic resonance imaging effective connectivity study. *Hum. Brain Mapp.* **37**, 663–677
450 (2016).
- 451 38. Morgan, P. M. & Tindale, R. S. Group vs Individual Performance in Mixed-Motive
452 Situations: Exploring an Inconsistency. *Organ. Behav. Hum. Decis. Process.* **87**, 44–65
453 (2002).
- 454 39. Wildschut, T., Pinter, B., Vevea, J. L., Insko, C. A. & Schopler, J. Beyond the group
455 mind: a quantitative review of the interindividual-intergroup discontinuity effect. *Psychol. Bull.*
456 **129**, 698–722 (2003).

- 457 40. Turner, M. E. & Pratkanis, A. R. Twenty-Five Years of Groupthink Theory and
458 Research: Lessons from the Evaluation of a Theory. *Organ. Behav. Hum. Decis. Process.* **73**,
459 105–115 (1998).
- 460 41. Simms, A. & Nichols, T. Social Loafing: A Review of the Literature. *J. Manag. Policy*
461 *Pract.* **15**, 58–67 (2014).
- 462 42. Levine, D. K. & Palfrey, T. R. The Paradox of Voter Participation? A Laboratory Study.
463 *Am. Polit. Sci. Rev.* **101**, 143–158 (2007).
- 464 43. Hortensius, R. & de Gelder, B. The neural basis of the bystander effect — The
465 influence of group size on neural activity when witnessing an emergency. *NeuroImage* **93**, 53–
466 58 (2014).
- 467 44. Fischer, P. *et al.* The bystander-effect: a meta-analytic review on bystander
468 intervention in dangerous and non-dangerous emergencies. *Psychol. Bull.* **137**, 517–537
469 (2011).
- 470 45. Martin, K. K. & North, A. C. Diffusion of responsibility on social networking sites.
471 *Comput. Hum. Behav.* **44**, 124–131 (2015).
- 472 46. Lorenz, J., Rauhut, H., Schweitzer, F. & Helbing, D. How social influence can
473 undermine the wisdom of crowd effect. *Proc. Natl. Acad. Sci.* **108**, 9020–9025 (2011).
- 474 47. Farrell, S. Social influence benefits the wisdom of individuals in the crowd. *Proc. Natl.*
475 *Acad. Sci.* **108**, E625–E625 (2011).
- 476 48. Rauhut, H., Lorenz, J., Schweitzer, F. & Helbing, D. Reply to Farrell: Improved
477 individual estimation success can imply collective tunnel vision. *Proc. Natl. Acad. Sci.* **108**,
478 E626–E626 (2011).
- 479 49. Haggard, P. Sense of agency in the human brain. *Nat. Rev. Neurosci.* **18**, 196–207 (2017).
- 480 50. Caspar, E. A., Christensen, J. F., Cleeremans, A. & Haggard, P. Coercion Changes the
481 Sense of Agency in the Human Brain. *Curr. Biol.* **26**, 585–592 (2016).
- 482 51. Beyer, F., Sidarus, N., Bonicalzi, S. & Haggard, P. Beyond self-serving bias: diffusion
483 of responsibility reduces sense of agency and outcome monitoring. *Soc. Cogn. Affect.*
484 *Neurosci.* **2**, 138–145 (2016).
- 485 52. Dewey, J. A., Pacherie, E. & Knoblich, G. The phenomenology of controlling a moving
486 object with another person. *Cognition* **132**, 383–397 (2014).
- 487 53. Li, P. *et al.* The influence of the diffusion of responsibility effect on outcome
488 evaluations: electrophysiological evidence from an ERP study. *NeuroImage* **52**, 1727–1733
489 (2010).
- 490 54. Nicolle, A., Bach, D. R., Frith, C. & Dolan, R. J. Amygdala involvement in self-blame
491 regret. *Soc. Neurosci.* **6**, 178–189 (2011).
- 492 55. Pacherie, E. Intentional joint agency: shared intention lite. *Synthese* **190**, 1817–1839
493 (2013).
- 494 56. Pacherie, E. How does it feel to act together? *Phenomenol. Cogn. Sci.* **13**, 25–46
495 (2014).
- 496 57. Gallotti, M. & Frith, C. D. Social cognition in the we-mode. *Trends Cogn. Sci.* **17**, 160–
497 165 (2013).
- 498 58. Obhi, S. S. & Hall, P. Sense of agency and intentional binding in joint action. *Exp. Brain*
499 *Res.* **211**, 655 (2011).

- 500 59. van der Wel, R. P. R. D., Sebanz, N. & Knoblich, G. The sense of agency during skill
501 learning in individuals and dyads. *Conscious. Cogn.* **21**, 1267–1279 (2012).
- 502 60. van der Wel, R. P. R. D. Me and we: Metacognition and performance evaluation of
503 joint actions. *Cognition* **140**, 49–59 (2015).
- 504 61. Murayama, K. *et al.* How Self-Determined Choice Facilitates Performance: A Key Role
505 of the Ventromedial Prefrontal Cortex. *Cereb. Cortex* **25**, 1241–1251 (2015).
- 506 62. Dworkin, S. I., Mirkis, S. & Smith, J. E. Response-dependent versus response-
507 independent presentation of cocaine: differences in the lethal effects of the drug.
508 *Psychopharmacology (Berl.)* **117**, 262–266 (1995).
- 509 63. Marmot, M. G., Bosma, H., Hemingway, H., Brunner, E. & Stansfeld, S. Contribution
510 of job control and other risk factors to social variations in coronary heart disease incidence.
511 *Lancet Lond. Engl.* **350**, 235–239 (1997).
- 512 64. Botti, S. & Lyengar, S. S. The psychological pleasure and pain of choosing: when
513 people prefer choosing at the cost of subsequent outcome satisfaction. *J. Pers. Soc. Psychol.*
514 **87**, 312–326 (2004).
- 515 65. Botti, S. & McGill, A. L. When Choosing Is Not Deciding: The Effect of Perceived
516 Responsibility on Satisfaction. *J. Consum. Res.* **33**, 211–219 (2006).
- 517 66. Anderson, C. J. The psychology of doing nothing: forms of decision avoidance result
518 from reason and emotion. *Psychol. Bull.* **129**, 139–167 (2003).
- 519 67. Steffel, M., Williams, E. F., Morwitz, V. & Morales, A. Delegating Decisions: Recruiting
520 Others to Make Choices We Might Regret. *J. Consum. Res.* **44**, 1015–1032 (2018).
- 521 68. Dhar, R. The Effect of Decision Strategy on Deciding to Defer Choice. *J. Behav. Decis.*
522 *Mak.* **9**, 265–281 (1996).
- 523 69. Tversky, A. & Shafir, E. Choice under Conflict: The Dynamics of Deferred Decision.
524 *Psychol. Sci.* **3**, 358–361 (1992).
- 525 70. Novemsky, N., Dhar, R., Schwarz, N. & Simonson, I. Preference fluency in choice. *J.*
526 *Mark. Res.* **44**, 347–356 (2007).
- 527 71. Dhar, R. & Nowlis, S. M. The effect of time pressure on consumer choice deferral. *J.*
528 *Consum. Res.* **25**, 369–384 (1999).
- 529 72. Luce, M. F. Choosing to Avoid: Coping with negatively emotion-laden consumer
530 decisions. *J. Consum. Res.* **24**, 409–433 (1998).
- 531 73. Redelmeier, D. A. & Shafir, E. Medical decision making in situations that offer multiple
532 alternatives. *JAMA* **273**, 302–305 (1995).
- 533 74. Tetlock, P. E. & Boettger, R. Accountability amplifies the status quo effect when
534 change creates victims. *J. Behav. Decis. Mak.* **7**, 1–23 (1994).
- 535 75. Edelson, M. G., Polania, R., Ruff, C. C., Fehr, E. & Hare, T. A. Computational and
536 neurobiological foundations of leadership decisions. *Science* **361**, eaat0036 (2018).
- 537 76. Harvey, N. & Fischer, I. Taking Advice: Accepting Help, Improving Judgment, and
538 Sharing Responsibility. *Organ. Behav. Hum. Decis. Process.* **70**, 117–133 (1997).
- 539 77. Carl A. Kallgren, Raymond R. Reno & Robert B. Cialdini. A Focus Theory of Normative
540 Conduct: When Norms Do and Do not Affect Behavior. *Pers. Soc. Psychol. Bull.* **26**, 1002–
541 1012 (2000).
- 542 78. Mercier, H. and Sperber, D. *The Enigma of Reason*, Harvard University Press (2017)

- 543 79. Vig, E. K., Starks, H., Taylor, J. S., Hopley, E. K. & Fryer-Edwards, K. Surviving surrogate
544 decision-making: what helps and hampers the experience of making medical decisions for
545 others. *J. Gen. Intern. Med.* **22**, 1274–1279 (2007).
- 546 80. Botti, S., Orfali, K. & Iyengar, S. S. Tragic Choices: Autonomy and Emotional
547 Responses to Medical Decisions. *J. Consum. Res.* **36**, 337–352 (2009).
- 548 81. Lehtonen, J. & Jaatinen, K. Safety in numbers: the dilution effect and other drivers of
549 group life in the face of danger. *Behav. Ecol. Sociobiol.* **70**, 449–458 (2016).
- 550 82. Connolly, T. & Zeelenberg, M. Regret in Decision Making. *Curr. Dir. Psychol. Sci.* **11**,
551 212–216 (2002).
- 552 83. Frith, C.D., and Metzinger, T.K. What's the use of consciousness? How the stab of
553 conscience made us really conscious (2016). in Engel, A.K. et al. *The Pragmatic Turn: Toward*
554 *Action-Oriented Views in Cognitive Science*, MIT Press (2016).
- 555 84. Gilovich, T. & Medvec, V. H. The experience of regret: what, when, and why. *Psychol.*
556 *Rev.* **102**, 379–395 (1995).
- 557 85. Zeelenberg, M., van Dijk, W. W. & Manstead, A. S. R. Regret and Responsibility
558 Resolved? Evaluating Ordóñez and Connolly's (2000) Conclusions. *Organ. Behav. Hum.*
559 *Decis. Process.* **81**, 143–154 (2000).
- 560 86. Bourgeois-Gironde, S. How regret moves individual and collective choices towards
561 rationality. in *Chapters 188–204* (Edward Elgar Publishing, 2017).
- 562 87. Connolly, T., Ordóñez, L. D. & Coughlan, R. Regret and Responsibility in the
563 Evaluation of Decision Outcomes. *Organ. Behav. Hum. Decis. Process.* **70**, 73–85 (1997).
- 564 88. Ordóñez, L.D. & Connolly T., Regret and Responsibility: A Reply to Zeelenberg et al.
565 (1998). *Organ. Behav. Hum. Decis. Process.* **81**, 132–142 (2000).
- 566 89. Zeelenberg, M., van Dijk, W. W. & Manstead, A. S. R. Reconsidering the Relation
567 between Regret and Responsibility. *Organ. Behav. Hum. Decis. Process.* **74**, 254–272 (1998).
- 568 90. Kulakova, E., Khalighinejad, N. & Haggard, P. I could have done otherwise: Availability
569 of counterfactual comparisons informs the sense of agency. *Conscious. Cogn.* **49**, 237–244
570 (2017).
- 571 91. Frith, C. D. Action, agency and responsibility. *Neuropsychologia* **55**, 137–142 (2014).
- 572 92. Camille, N. et al. The involvement of the orbitofrontal cortex in the experience of regret.
573 *Science* **304**, 1167–1170 (2004).
- 574 93. Coricelli, G. et al. Regret and its avoidance: a neuroimaging study of choice behavior.
575 *Nat. Neurosci.* **8**, 1255–1262 (2005).
- 576 94. Zeelenberg, M., Beattie, J., van der Pligt, J. & de Vries, N. K. Consequences of Regret
577 Aversion: Effects of Expected Feedback on Risky Decision Making. *Organ. Behav. Hum.*
578 *Decis. Process.* **65**, 148–158 (1996).
- 579 95. Zeelenberg, M. & Beattie, J. Consequences of Regret Aversion 2: Additional Evidence
580 for Effects of Feedback on Decision Making. *Organ. Behav. Hum. Decis. Process.* **72**, 63–78
581 (1997).
- 582 96. Fehr, E. & Fischbacher, U. Third-party punishment and social norms. *Evol. Hum.*
583 *Behav.* **25**, 63–87 (2004).
- 584 97. Dai, X. Toward a Reputation State: The Social Credit System Project of China, *Social*
585 *Science Research Network*. Available at SSRN: <https://ssrn.com/abstract=3193577>
586 (2018)

- 587 98. Bartling, B. & Fischbacher, U. Shifting the Blame: On Delegation and Responsibility.
588 *Rev. Econ. Stud.* **79**, 67–87 (2012).
- 589 99. Williams, G. Responsibility. Internet Encyclopedia of Philosophy, ISSN 2161-0002.
590 Available: <http://www.iep.utm.edu/responsi/>.
- 591 100. Edwards, J. "Theories of Criminal Law", in *The Stanford Encyclopedia of Philosophy*;
592 (Edward N.Z, ed.), Metaphysics Research Lab, Stanford University (2018)
- 593 101. Waytz, A. & Young, L. The Group-Member Mind Trade-Off: Attributing Mind to Groups
594 Versus Group Members. *Psychol. Sci.* **23**, 77–85 (2012).
- 595 102. Newheiser, A.-K., Sawaoka, T. & Dovidio, J. F. Why do we punish groups? High
596 entitativity promotes moral suspicion. *J. Exp. Soc. Psychol.* **48**, 931–936 (2012).
- 597 103. Gerstenberg, T. & Lagnado, D. A. When contributions make a difference: explaining
598 order effects in responsibility attribution. *Psychon. Bull. Rev.* **19**, 729–736 (2012).
- 599 104. Zultan, R., Gerstenberg, T. & Lagnado, D. A. Finding fault: Causality and
600 counterfactuals in group attributions. *Cognition* **125**, 429–440 (2012).
- 601 105. Lagnado, D. A., Gerstenberg, T. & Zultan, R. Causal responsibility and
602 counterfactuals. *Cogn. Sci.* **37**, 1036–1073 (2013).
- 603 106. Duch, R., Stevenson, R. & Przepiorka, W. Responsibility Attribution for Collective
604 Decision Makers. *Am. J. Polit. Sci.* **59**, (2011).
- 605 107. Gerstenberg, T. and Lagnado, D.A. Attributing responsibility: Actual and counterfactual
606 worlds (2014). In *Oxford Studies of Experimental Philosophy* (Knobe, J., Lombrozo, T. and
607 Nichols, S., eds.), pp. 91–130, Oxford University Press (2014).
- 608 108. Coffee, J.C. "No Soul to Damn: No Body to Kick": An Unscandalized Inquiry into the
609 Problem of Corporate Punishment. *Michigan Law Review* (1981).. Vol.79, Iss.3 Pages:386-4
- 610 109. Ohlin, J. D. Three Conceptual Problems with the Doctrine of Joint Criminal Enterprise.
611 *J. Int. Crim. Justice* **5**, 69–90 (2007).
- 612 110. Jacobson, J. et al. Joint enterprise: Righting a wrong turn? Prison Reform Trust (2016).
- 613 111 Grossman, E. France's Yellow Vests – Symptom of a Chronic Disease, *Political Insight*,
614 **10**, 30-34 (2019)
- 615 112. Hogarth, R.M. What's a "Good" Decision? Issues in Assessing Procedural and
616 Ecological Quality. In *The Wiley Blackwell Handbook of Judgment and Decision Making*
617 (Keren, G. and Wu, G., eds), pp. 952–972, John Wiley & Sons, Ltd (2015)
- 618 113. Frey, R., Hertwig, R. & Herzog, S. M. Surrogate Decision Making Do We Have to Trade
619 Off Accuracy and Procedural Satisfaction? *Med. Decis. Making* **34**, 258–269 (2014).
- 620 114. Frey, R., Herzog, S. M. & Hertwig, R. Deciding on behalf of others: a population survey
621 on procedural preferences for surrogate decision-making. *BMJ Open* **8**, e022289 (2018).
- 622 115. Aspinall, W. A route to more tractable expert advice. *Nature* **463**, 294–295 (2010).
- 623 116. Hertwig, R., Pleskac, T. J., Pachur, T., & the Center for Adaptive Rationality (in press).
624 *Taming uncertainty*. Cambridge: MIT Press.
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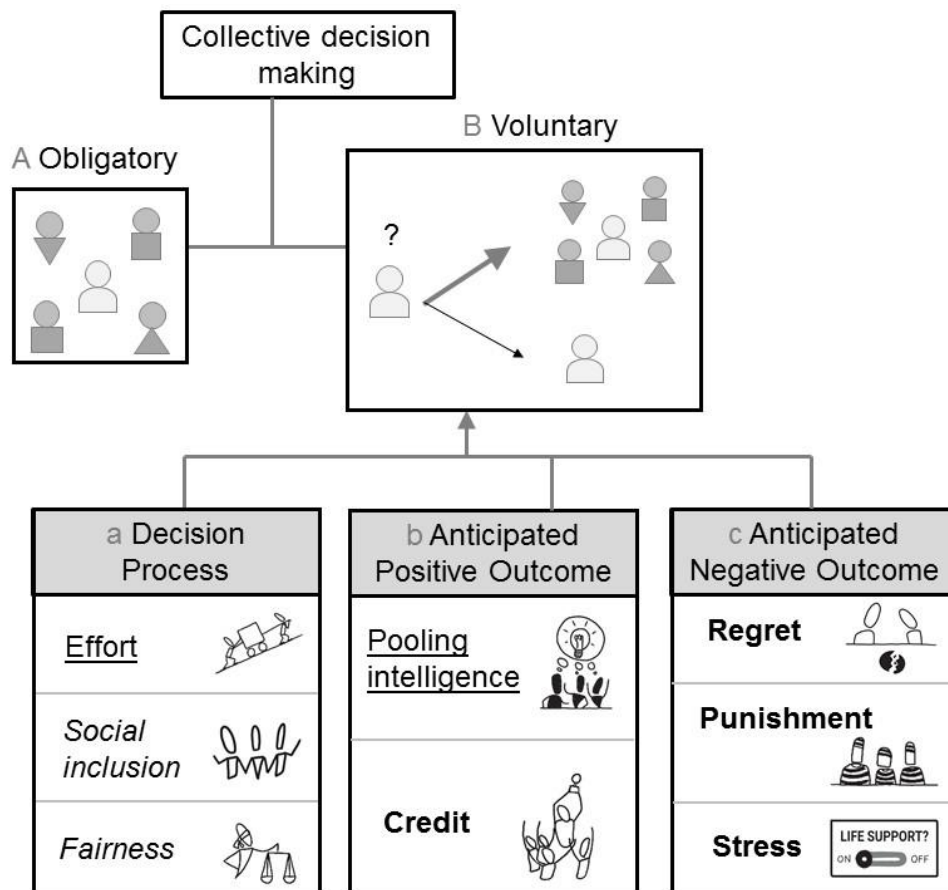
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638 Competing interests

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Figure 1. Motives for collective decision making. A framework for understanding individuals' motives for engaging in collective decision-making behaviors. The first distinction is between circumstances in which collective decisions are **A**) obligatory versus **B**) voluntary. We focus on the latter (A). The second distinction is between motives that relate to a) the decision process itself and (b–c) its anticipated outcome. The different motives are linked back to the three categories identified in the main text: improving outcomes (underlined, Category 1); social inclusion and normative needs (in italic, Category 2); shared responsibility (in bold, Category 3). **a**) Under the process-related motives, individuals combine their efforts during the decision process (Effort), feel included in the group (*Social inclusion*), and fulfill their normative needs for fairness and procedural justice (*Fairness*). **b**) Under an anticipated positive outcome, individuals pool intelligence to reach a better/positive outcome (Pooling intelligence) and are able to claim credit for successful outcomes (**Credit**). **c**) Under an anticipated negative outcome associated with decision uncertainty or difficulty—our focus in the main text—sharing responsibility reduces **Regret**, **Punishment**, and **Stress**.