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Social Psychology

Known Unknowns in Motivated Reasoning: A Closer Look at Three Open Questions

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Motivated reasoning denotes the phenomenon that individuals are more likely to arrive at conclusions that they want to arrive at. Properly understanding this phenomenon requires at least three things: first, to pin down the preconditions of motivated reasoning; second, to identify the cognitive processes that lead to biased judgments; and third, to identify whether a measured bias is the result of motivated reasoning or other processes. Although motivated reasoning has received continued attention from the research community over the last decades, there are considerable conceptual ambiguities regarding these three aspects. By focusing on key publications that have had a formative effect on the development of the field as well as recent publications that reflect the state-of-the-art, the present paper provides a concise and selective overview of research on motivated reasoning, discusses existing conceptual ambiguities, and derives recommendations for future research.

> Once a man's understanding has settled on something (either because it is an accepted belief or because it pleases him), it draws everything else also to support and agree with it. And if it encounters a larger number of more powerful countervailing examples, it either fails to notice them, or disregards them, or makes fine distinctions to dismiss and reject them, and all this with much dangerous prejudice, to preserve the authority of its first conceptions. (Bacon, 1620/2000, p. 43)

Introduction

The observation that "people are more likely to arrive at conclusions that they want to arrive at" (Kunda, 1990, p. 480) is commonly referred to as *motivated reasoning*. As indicated by the above quote taken from Francis Bacon's *Novum Organon* originally published a little more than 400 years ago, this is far from being a new observation. Over the past decades, however, motivated reasoning has gained unprecedented scholarly attention and was demonstrated for a vast range of topics (for an overview of the history of research on motivated reasoning, see Ditto, 2009), such as capital punishment (Lord et al., 1979), gun control (Kahan et al., 2017; Washburn & Skitka, 2018), veganism (Altenmüller et al., 2021), climate change (P. S. Hart & Nisbet, 2012; Hutmacher et al., 2024; Nurse & Grant, 2020), nanotechnology (Kahan et al., 2009), pacifism (Bender et al., 2016), gaming (Nauroth et al., 2014, 2015), the COVID-19 pandemic (Hutmacher et al., 2022), and the implementation of women's quotas (Altenmüller & Poppe, 2024).

To scientifically study the phenomenon of motivated reasoning, at least three questions are central. First, what are the preconditions that give rise to motivated reasoning? Second, how do people arrive at the judgments they want to arrive at? In other words, what are the cognitive processes that lead to biased judgments? Third, how can scientists identify whether a given judgment is the result of motivated reasoning? Admittedly, these questions are not new; quite the contrary, they concern the very foundations of research on motivated reasoning. As we will demonstrate in the following, however, many aspects of these fundamental questions remain unanswered, making them *known unknowns*. Hence, we divide our manuscript into three parts, each part dedicated to discussing one of them. Given that motivated reasoning has received continued attention from the research community, resulting in an impressive body of literature, including each and every article that has been published is beyond the scope of this paper. To nonetheless provide a comprehensive and balanced review, we decided to focus on (a) key publications that have had a formative effect on the development of the field, (b) recent publications that map the state-of-the-art, and (c) publications that present analyses of key issues of debate. Following an initial expert-based identification of relevant work, we con-

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ducted a literature search on *Web of Science* to ensure comprehensive coverage of the relevant publications. Specifically, we used "motivated reasoning" as the topic keyword and restricted the search to the research area "psychology". To identify key publications, we applied the "highly cited" filter. To identify recent publications, we alternatively restricted the search to work published since 2020. Naturally, both sets of publications did not only include empirical studies but also publications that present analyses of key issues of debate.[1] While the largest body of research on motivated reasoning has been produced by social and political psychologists, we additionally included work from neighboring fields such as economics and cognitive science that offered valuable insights. As we will show in our analysis, research on motivated reasoning is not in need of generally new conceptual frameworks and theoretical propositions: The key issues have long been identified and still stand. What is needed is a better understanding of the existing core concepts. By providing a concise but comprehensive overview of the current state of research and by identifying the gaps in our knowledge regarding the three known unknowns, the present work aims to be a first step towards creating such a better understanding.

Known Unknowns in Motivated Reasoning

Known Unknown #1: What are the Preconditions of Motivated Reasoning?

Research on motivated reasoning typically differentiates between two distinct types of goals that influence how individuals process information: accuracy goals and directional goals (Kunda, 1990; see also Taber & Lodge, 2006; West & Kenny, 2011). When individuals are driven by accuracy goals, they strive to be correct and objective (*non-directional motivated reasoning*); when individuals are driven by some kind of directional goal, they have a desire to arrive at a certain conclusion (*directional motivated reasoning*). These motivational influences can be seen as conceptually separate (e.g., van Bavel & Pereira, 2018; see also Hutmacher et al., 2025).[2] In other words, a person who is highly driven to find an accurate answer might simultaneously have a strong – or weak – desire to confirm a particular outcome, and vice versa. Consequently, it is often proposed that these two types of goals are balanced against each other, such that either accuracy or directional goals (or neither) take precedence during information processing. Against this background, it is sometimes claimed that "*all reasoning is motivated*" (Taber & Lodge, 2006, p. 756, emphasis in original). Usually, however, the term motivated reasoning is used in a narrower sense, referring to situations in which directional goals are strong and dominant over accuracy goals, systematically shifting information processing towards biased conclusions (see, e.g., Bayes & Druckman, 2021; Flynn et al., 2017). When speaking about motivated reasoning in the following, we will follow this established narrower reading of motivated reasoning. Note, however, that in order to understand what a biased judgment is, one also needs to understand how an unbiased judgment would look like. That is, in order to understand how directional motivated reasoning deviates from unbiased reasoning, it is also helpful to consider cases in which accuracy goals are strong and dominant. We will return to this point when describing the second and third *known unknown*. That being said, what are the preconditions of (directional) motivated reasoning?

In her seminal paper, Ziva Kunda (1990; see also Kunda, 1992) suggested that "any wish, desire, or preference that concerns the outcome of a given reasoning task" (p. 480) may drive motivated reasoning. Most obviously, this refers to goals that are closely linked to one's self-concept or identity, such as striving for belief-consistency, upholding a positive self-image, or protecting oneself from an identity threat (cf. Molden et al., 2022). For example, individuals may engage in motivated reasoning processes when a certain piece of information that they are being confronted with challenges their political identity (e.g., when empirical research contradicts their attitudes towards a policy or when their favorite politician misbehaves in one way or another). However, it has been suggested that motivated reasoning can also be triggered by more specific goals that are not linked to one's self-concept, such as gaining material incentives, wanting to minimize one's effort at a given task, or simply enjoying what one is currently doing (Kunda, 1990; see also Tappin et al., 2020). For instance, when a coffee drinker is told that a recent study has shown that coffee has negative health effects, this may diminish their enjoyment of a good cup of coffee, which could in turn trigger processes of motivated reasoning.

Notably, it has been argued that drawing a clear-cut distinction between motivated reasoning in situations involving the self-concept and situations not involving the

1 Note that we did not include all papers identified through this additional search but only those that were relevant with respect to the three *known unknowns* discussed in the following. More specifically, we first scanned the titles and abstracts of the identified papers to determine whether they potentially provided insights with respect to at least one of the three *known unknowns*. If this was the case, we accessed and read the full papers to extract the relevant findings and ideas. A detailed documentation of our online search can be found on the OSF (https://osf.io/7pu5t).

2 Alternatively, it has also been proposed to view directional motivated reasoning as flipside to non-directional motivated reasoning in the sense that individuals *either* have an accuracy motivation *or* are driven by some kind of directional goal (i.e., the more a person is motivated to arrive at a particular conclusion, the less the person will care about being rational and objective; see, e.g., Tappin et al., 2020). As it is well-known that individuals can hold several – sometimes even contradictory – goals at the same time (see, e.g., Kruglanski et al., 2002), we believe that the perspective provided in the main text is more convincing. Note, however, that the considerations presented regarding the three *known unknowns* would not change if accuracy and directional goals were indeed mutually exclusive.

self-concept may create a false dichotomy. Arguably, the self-concept is likely to be involved even in cases that initially appear tied to more specific goals only (Carpenter, 2019): Being informed that coffee has negative health effects may not so much trigger motivated reasoning because it diminishes the enjoyment of drinking coffee; rather, it may trigger motivated reasoning because being a coffee drinker, that is, being a person who enjoys drinking coffee and who has embedded drinking coffee in their daily routines, is part of one's self concept (see Liberman & Chaiken, 1992). Following this line of reasoning, specific goals might only trigger motivated reasoning because and insofar as they are related to one's self-concept or identity (Carpenter, 2019). In other words, we should think of the involvement of the self-concept as a continuum: The more relevant and central a certain attitude, value, or worldview is for one's self-concept or identity, the more likely a challenge to this attitude, value, or worldview will lead to motivated reasoning processes (see Howe & Krosnick, 2017). In sum, it seems straightforward to consider self-concept or identity relevance as the key variable for determining the expected degree of motivated reasoning. Nevertheless, more research is needed to test whether all instances of motivated reasoning can really be subsumed in this way or whether there are also situations in which motivated reasoning occurs without the self-concept or identity playing a significant role. Interestingly, research from cognitive science provides evidence that motivated reasoning can indeed occur even in abstract, self-irrelevant tasks (e.g., reinforcement learning; Palminteri et al., 2017; for a theoretical integration, see Palminteri & Lebreton, 2022). As the authors of these papers write themselves, however, it remains an open question whether the similarities observed between low-level reinforcement learning tasks and high-level reasoning situations embedded in social environments "are caused by shared neurocomputational mechanisms, or whether they have emerged independently in two separate pathways" (Palminteri & Lebreton, 2022, p. 619).

Importantly, considering the extent of self-concept relevance as precondition of motivated reasoning does not solve all theoretical difficulties: Obviously, attitudes, values, and worldviews are not all the same conceptually – neither within concepts (e.g., not all attitudes are the same), nor between concepts (e.g., attitudes and worldviews are not the same; see, e.g., Bayes et al., 2020; Bayes & Druckman, 2021). So, what should researchers look at when investigating motivated reasoning: attitudes, values, worldviews, or maybe even other related variables such as political affiliation? What is the right level of analysis, and which potential precondition of motivated reasoning can be expected to play a role in a given situation? These are important questions – especially as "little work assesses which of the directional motivations … is at work and when" (Bayes & Druckman, 2021, p. 31). One helpful suggestion can be found in the context of research on the motivated rejection of science (i.e., a specific subdomain of motivated reasoning). Here, it has been proposed to differentiate between *surface attitudes* and *attitude roots* (Hornsey, 2020; Hornsey & Fielding, 2017). The term "surface attitudes" refers to specific, concrete, and manifest attitudes (e.g., "I believe that migration has more advantages than disadvantages for our society"), while the term "attitude roots" refers to the broader, sometimes rather latent ideologies, worldviews, and identities that underly these attitudes (e.g., "I am a liberal", "In general, I am convinced that collective interests should be prioritized over the freedom of the individual"). Crucially, proponents of this view argue that focusing on attitude roots rather than surface attitudes when investigating motivated reasoning might be more informative for at least two reasons (see Hornsey, 2020; Hornsey & Fielding, 2017).

First, taking attitude roots into account can help identify commonalities between seemingly unconnected instances of motivated reasoning. That is, referring to attitude roots has an explanatory breadth that referring to separate and unrelated surface attitudes has not: For instance, political identities such as being a Democrat or Republican in the U.S. have been shown to instigate motivated reasoning with respect to a wide range of topics (e.g., gun regulation, capital punishment, climate mitigation policies), all of which are central to the political ideologies (e.g., P. S. Hart & Nisbet, 2012; Lord et al., 1979; Washburn & Skitka, 2018). If research merely focused on surface attitudes regarding these different topics without considering political orientation, it would miss that these cases are not strictly separate but follow a common pattern.

Second, and in line with what was said above, for a surface attitude to be associated with motivated reasoning, there needs to be *something* "that lends the [surface] attitude psychological power and coherence" (Hornsey & Fielding, 2017, p. 460). Arguably, this *something* are the attitude roots: Individuals who hold certain attitudes are more likely to show motivated reasoning when these attitudes are more central to their self-concept or identity. Thus, focusing on surface attitudes instead of attitude roots runs the risk of missing what is the key precondition of motivated reasoning in a certain situation. For instance, it may not so much be the attitude towards climate change that drives motivated reasoning of mitigation policies per se, but rather the fact that this attitude is a concomitant of one's worldview and preferred ideology (for another example concerning the deeper roots underlying anti-vaccination attitudes, see Hornsey et al., 2018).

This differentiation also has important implications for what can be done to reduce motivated reasoning. Changing attitudes can be successful even without addressing attitude roots and by targeting "the surface" only. For instance, some studies suggest that motivated beliefs can be changed by more information on the issue, especially when the scientific consensus is (communicated as) clear and normative (Anglin, 2019; Anglin et al., 2025; van Stekelenburg et al., 2022; Vlasceanu & Coman, 2022) and when trust in science is high, enabling individuals to take a nuanced stance on findings they are presented with (Rosman & Grösser, 2024). However, it has repeatedly been pointed out that the effects of trying to change attitudes by providing more information and better explanations of the available evidence often

tends to be limited (cf. Lombrozo et al., 2006; Shtulman, 2006; Sturgis & Allum, 2004). Arguably, this is because this kind of interventions leaves the underlying attitude roots unchanged (Hornsey & Fielding, 2017). To give but one example, it may be easier and more impactful to convince a conservative of the importance of climate mitigation policies by referring to the idea that humans should protect God's creation rather than by referring to the limitations of a capitalist growth economy (and vice versa for a left-leaning individual; cf. P. G. Bain et al., 2012; Fielding et al., 2020).

However, focusing on attitude roots when investigating motivated reasoning is also not without its problems. From a methodological point of view, one might object that it is more direct to measure the attitude at the same level of analysis as the attitude-relevant information a person receives in a study. When investigating motivated reasoning in the context of climate change, for instance, attitudes towards climate change are a much more immediate proxy for directional goals than political identity. In line with such methodological concerns, one might argue that looking at attitude roots instead of surface attitudes may not be *more,* but *less* informative. More specifically, looking at attitude roots may neglect variation within groups: While conservatives might overall be more skeptical regarding climate mitigation policies than liberal or left-leaning individuals (cf. Berkebile-Weinberg et al., 2024), this pattern will usually not apply to *all* individuals within these groups. That is, there will be conservatives who are strongly in favor of climate mitigation policies and liberals who are strongly against them. For these individuals, however, political orientation or worldview will not be a good predictor for the strength and direction of motivated reasoning in the context of climate mitigation policies. Moreover, which surface attitudes are associated how strongly with which attitude root may change across (cultural) contexts: While there is a clear partisan divide with respect to attitudes towards gun regulations in the US, for instance, the topic is far less salient and polarized in many other countries' political discourses across the globe (see Fox et al., 2024; McLean, 2015). From a more abstract point of view, this means that the links between certain attitude roots and certain surface attitudes may in fact be weaker and less clear than usually assumed, making it implausible to consider surface attitudes as nothing but a byproduct of certain attitude roots.

On an even more fundamental level, one could argue that the distinction between surface attitudes and attitude roots is generally too coarse to resolve the existing conceptual issues. Consequently, talking about attitude roots would rather obscure than illuminate the preconditions of motivated reasoning by hiding vastly different parameters behind a veil of uniformity (see Bayes et al., 2020). For instance, it has been empirically demonstrated that "different ideological predictors are related to the acceptance of different scientific findings" (Rutjens et al., 2018, p. 384), suggesting that different attitude roots are relevant in different contexts. In a similar vein, it has been shown that the decision not to get vaccinated can flow from a wide range of psychological factors and underlying attitude roots (Fasce et al., 2023; Holford et al., 2024; Hornsey et al., 2018). If this is the case, however, a proper understanding of the preconditions of motivated reasoning would require being able to tell which attitude root is relevant in which context and for which person. That is, more research is needed to disentangle the different preconditions of motivated reasoning, both conceptually (i.e., How exactly should we define attitude, values, worldview, and the like and how do they differ from one another?) and empirically (i.e., How are these different concepts related to one another in a certain context?). For instance, conceptual mapping studies or network analytic approaches could clarify and visualize the relationships between different surface attitudes and attitude roots. Another way forward might be to pursue multi-level and multi-dimensional research designs that systematically compare different surface attitudes and attitude roots in their ability to predict motivated reasoning. In addition, longitudinal studies could track how surface attitudes and their underlying roots develop over time, especially in response to societal events or scientific controversies (e.g., a pandemic, an extreme weather event). In a similar vein, large-scale, cross-national surveys could be used to examine how the linkage between surface attitudes and roots varies across political, cultural, or religious contexts. Taken together, these recommendations might allow scholars to articulate a more fine-grained architecture of the psychological foundations of motivated reasoning.

Finally, it is important to take boundary conditions into account: Even if certain preconditions for engaging in motivated reasoning are present, this does not mean that individuals will hold to be true whatever they want to be true. That is, although motivated reasoning is often considered to be "hard-wired" in human psychology in the sense that it is a result of the way the human mind has evolved over the course of history (e.g., Clark & Winegard, 2020; Sharot & Garrett, 2016), its degree is not unlimited: "Biased information processing may be ubiquitous, but its reach must end somewhere" (Már & Gastil, 2020, p. 107). To begin with, the degree of motivated reasoning can vary substantially between individuals and across contexts. As far as individual differences are concerned, one particularly prominent debate revolves around the role of deliberation (i.e., the investment of cognitive effort): While some claim that higher scientific reasoning abilities and a tendency towards more actively open-minded thinking are associated with reduced motivated reasoning (e.g., Anglin et al., 2023; Pennycook et al., 2023; Stenhouse et al., 2018), others have observed that individuals can also use their abilities for finding rationalizations for their preexisting views (e.g., Drummond & Fischhoff, 2017; Kahan et al., 2012; Nurse & Grant, 2020; for an attempt at a theoretical integration, see Hutmacher et al., 2025). Of note, however, other recent research finds no evidence of interindividual, trait-like differences in motivated reasoning (e.g., regarding conspiracy mentality, ambiguity tolerance, Need for Cognition, and the Dark Factor of Personality; Altenmüller & Poppe, 2024; Hutmacher et al., 2024). Regarding contextual factors, motivated reasoning seems to be particularly prevalent when information is

ambiguous and open to interpretation, that is, when it is relatively easy to bend the available information in a preferred direction (Sharot & Garrett, 2016). Nevertheless, it has been demonstrated, for instance, that providing bias feedback (C. T. Ziemer et al., 2024) and strengthening the accuracy goals that are competing with directional goals (e.g., through providing incentives and accuracy nudges; e.g., Bolsen et al., 2014; Rathje et al., 2023; Zimmermann, 2020) can both reduce motivated reasoning at least to a certain degree.

Going beyond such individual and contextual influences, there are at least two factors limiting the degree of motivated reasoning on a principal level: First, it has repeatedly been argued that individuals strive to uphold an *illusion of objectivity* (Pyszczynski & Greenberg, 1987; see also Kunda, 1990; Taber & Lodge, 2006). Even when individuals engage in motivated reasoning, they want to appear rational by finding justifications for their desired conclusions that conform to the rules of logic and that are based on some kind of evidence. In this context, there is also research suggesting that individuals who are confronted with an overwhelming amount of evidence running counter to their preferred view may reach an affective tipping point after which they feel the need to change their perspective as further sticking to it has become too implausible (Redlawsk et al., 2010). Second, individuals are guided by what has been called the *utilitarian principle* (Carpenter, 2019): They will only engage in motivated reasoning insofar as it does not conflict with the necessities of reality. In other words, "we could not successfully navigate everyday life if we acted based only on what we want to be true rather than what was true" (Carpenter, 2019, p. 11; see also Jussim, 2017). While it might generally be helpful for individuals to be self-confident (e.g., to achieve the goals that one has set for oneself), for instance, they also need to avoid being overly self-confident (Bénabou & Tirole, 2002). That is, while believing in one's athletic abilities may help an individual to stay focused on their training, there is no point in believing that one is a highly talented athlete if any attempt to demonstrate this talent will quickly falsify this belief.

In sum, identifying the preconditions and boundary conditions of motivated reasoning remains a thorny issue: Not so much because it is difficult to identify potential preconditions and boundary conditions of motivated reasoning, but rather because it often remains elusive, which factor is relevant in which context. For future research, this entails a twofold task: First, to move towards a theoretically founded understanding of the existing interconnections between different preconditions of motivated reasoning; and second, to design and conduct (experimental) studies that allow clear interpretations regarding the precondition(s) of motivated reasoning that are relevant in a given context.

Known Unknown #2: Which Processes Lead to Biased Judgments?

Motivated reasoning can potentially occur at all stages of information processing (for an overview, see Ditto et al., 2025; Hahn & Harris, 2014), that is, when retrieving information from memory (*selective memory retrieval*), when selecting new information one attends to and processes (*selective exposure*, sometimes also referred to as selective attention or selective information seeking), and when evaluating information (*selective information evaluation*, sometimes also referred to as myside bias or wishful thinking). Of course, these three aspects can complement each other, ultimately all contributing to biased judgments (Dereumaux et al., 2022). For instance, individuals may first selectively expose themselves to information that aligns with their preferences and then additionally evaluate the selected information in a biased manner. For analytic clarity, we nevertheless examine the state of the art for each of these processes separately.

As far as *selective memory retrieval* is concerned, there is meta-analytic evidence that preference-consistent information is remembered better than preference-inconsistent information (Eagly et al., 1999). It should be noted, however, that the overall effect found in the meta-analysis was small and that there was considerable heterogeneity across studies. From a theoretical perspective, it has been argued that individuals may sometimes be motivated to forget preference-inconsistent information but that it can also be helpful to remember this kind of information to be able to develop more sophisticated counterarguments (cf. Eagly et al., 2001). For instance, one may be motivated to forget that a politician that one genuinely likes has done something wrong; it would equally make sense, however, to remember this instance and to find rationalizations for the politician's behavior. More recent empirical evidence supports this somewhat older meta-analytic evidence, suggesting that selective memory retrieval does often not play a prominent role (Vedejová & Čavojová, 2022).

For *selective exposure*, a similar pattern has been observed (for a meta-analysis, see W. Hart et al., 2009): Overall, individuals prefer exposing themselves to preference-consistent (over preference-inconsistent) information. This general pattern holds true for information seeking behavior in both traditional media outlets (Rodriguez et al., 2017) and online media (Bakshy et al., 2015; Dejean et al., 2022; Vedejová & Čavojová, 2022) – and it also holds true for interactions with others (Frimer et al., 2017; Gimpel & Hui, 2015; Motyl et al., 2014). Interestingly, selective exposure has even been observed among experts (e.g., regarding the diagnostic reasoning of clinical psychologists; Neal et al., 2024), showing that it can be considered a widespread phenomenon. At the same time, however, there is again considerable variation across studies, suggesting that the degree of selective exposure may be shaped by contextual factors (cf. W. Hart et al., 2009). For example, individuals may seek out preference-inconsistent information (e.g., by reading a news report or by watching a YouTube video) because they want to understand and monitor how people with views different from their own construe their world. Relatedly, research on stereotyping has shown that high- (compared to low-) prejudice people pay close attention to and thoroughly encode stereotype-inconsistent information in order to explain it away (Sherman et al., 2005).

In sum, with respect to selective memory retrieval and selective exposure, both turning towards preference-con-

sistent information as well as turning towards preference-inconsistent information can be seen as an indication of motivated reasoning, rendering clear-cut conclusions and the interpretation of the meta-analytic evidence difficult. Arguably, this problem does not occur in the case of *selective information evaluation*, which can therefore be considered to provide the clearest instance of motivated reasoning, and which has also been studied most frequently (see Tappin et al., 2020).

The basic observation is this: When being confronted with new information, individuals evaluate this information more favorably when it is consistent with their preferences than when it is not (for one of the earliest empirical demonstrations, see Lord et al., 1979; for more recent empirical evidence, see Celniker & Ditto, 2024; for a meta-analysis, see Ditto et al., 2019). Whereas selective memory retrieval and selective exposure are concerned with the conditions that might restrict the diversity of the available information, selective information evaluation is concerned with the reasoning processes that individuals engage in once they are confronted with a certain piece of information. More specifically, selective information evaluation is usually considered to consist of a combination of motivated acceptance of preference-consistent information and the motivated rejection of preference-inconsistent information. However, what are the exact information processing mechanisms behind motivated acceptance and motivated rejection?

Two perspectives can be distinguished here: a *quality of processing perspective* and a *quantity of processing perspective* (see, e.g., Ditto, 2009; Jost et al., 2013). According to the quality of processing perspective (cf. Kunda, 1990), motivated reasoning changes the *kind* of information processing mechanisms at play in the sense that individuals find ways of constructing sophisticated arguments explaining why the preference-consistent information is valid and why the preference-inconsistent information is invalid. This may include selecting different statistical heuristics and using different inferential rules when being exposed to preference-consistent and preference-inconsistent information, respectively (Bénabou & Tirole, 2016; Effron et al., 2024; for some early examples, see also Ginossar & Trope, 1987; Sanitioso & Kunda, 1991). When comparing the piece of information that individuals are currently evaluating to other pieces of information, for instance, they may choose comparisons that enable them to accept preference-consistent information (e.g., "Compared to how politicians should behave, this politician that I dislike is really bad") and to reject preference-inconsistent information (e.g., "Compared to how other politicians actually behave, this politician that I like is not that bad"; see Effron et al., 2024). To give an additional example from a non-political context, it has been shown that frequent and infrequent gamblers differ in the cognitive strategies that they use to evaluate wins and losses, which may ultimately enable frequent gamblers to continue gambling despite negative outcomes (Anthony et al., 2024): While infrequent gamblers make use of upward counterfactuals after a loss (i.e., imagine how the losing outcome could have been better) and downward counterfactuals after a win (i.e., imagine how the winning outcome could have been worse), frequent gamblers use both upward and downward counterfactuals after both wins and losses.

According to the quantity of processing perspective (cf. Ditto, 2009), motivated reasoning does not so much change the kind of information processing mechanisms at play but rather the *intensity* of information processing, that is, the degree to which individuals engage in information processing: When being confronted with preference-consistent information, individuals will accept this information relatively quickly and uncritically. When being confronted with preference-inconsistent information, however, individuals are more likely to engage in a sophisticated cognitive analysis that ultimately enables them to dismiss the respective piece of information (see also Bénabou & Tirole, 2016).

Of course, these perspectives are not mutually exclusive (cf. Jost et al., 2013): It is very well possible that motivated reasoning is based on adapting both the kind *and* intensity of information processing in accordance with the initial experience of (in-)consistency of the information in question. As gaining deeper insights into the processes underlying motivated reasoning is indispensable for a more comprehensive understanding of the phenomenon, more research in this direction is needed. However, disentangling the cognitive processes underlying motivated reasoning is a difficult endeavor as it requires theoretical models that specify the processes and the conditions under which the processes operate, experimental paradigms that manipulate these conditions, and measurement procedures that generate measurement outcomes which can be unequivocally interpreted as indicators of the cognitive processes. For instance, one might start by more closely observing and mapping individuals' thought processes when evaluating information. Once the relevant processes have been identified more clearly, the next step would be to find a way to measure and disentangle the impact of these different processes empirically. In the related area of misinformation, for instance, it has recently been proposed to view the relevant processes at play through the lens of signal-detection theory (Gawronski et al., 2023, 2024). More specifically, it has been argued that the processes influencing an individual's reaction to misinformation – namely the ability to discern between true and false information, the threshold for accepting a certain piece of information as true, and the degree to which individuals treat preference-consistent evidence more favorably – can all be modeled using the logic of signal-detection theory, which also has important implications for the way the respective studies should be designed. Although this logic can arguably not be directly transferred to motivated reasoning, it may still hold important inspirations for the field.

Finally, there is one more aspect to be considered: Once individuals have passed through the different stages of information processing, they need to update their prior beliefs in light of the evidence that they have selected and evaluated. In this context, it has often been suggested that individuals show a tendency for *biased belief updating*, that

is, an asymmetry regarding the way they accommodate their prior beliefs in response to preference-consistent and preference-inconsistent information (for empirical demonstrations, see, e.g., Su, 2022; Sunstein et al., 2016; for an overview, see Sharot et al., 2023; Sharot & Garrett, 2016; see also Bénabou, 2015; Bénabou & Tirole, 2002, 2016). More specifically, the key idea is that individuals adjust their beliefs more strongly in response to preference-consistent than in response to preference-inconsistent information. However, this line of research has also been criticized on both methodological and theoretical grounds. On the one hand, it has been argued that biased belief updating might be a statistical artifact resulting from the specifics of the experimental designs employed in the studies (e.g., Burton et al., 2022; Harris et al., 2013; Shah et al., 2016; for a rebuttal, see Garrett & Sharot, 2017). At the very least, there are multiple studies showing that individuals are in principle receptive to evidence and that the degree of biased belief updating depends on various boundary conditions (e.g., Anglin, 2019; Anglin et al., 2025; Rosman & Grösser, 2024; van Stekelenburg et al., 2022; Vlasceanu & Coman, 2022). On the other hand, it has been suggested that the process of belief updating might actually be cognitively impenetrable (Sommer et al., 2024). If this were true, biased belief updating would not so much result from an asymmetry during the updating process but rather from the biased processing of information preceding this updating process. That is, while individuals have at least some degrees of freedom regarding the way they select and process information and therefore some indirect control regarding which information influences their beliefs, the actual process of belief updating after completing the evidence evaluation process is not shaped by directional goals. A deeper discussion and evaluation of the positions in these ongoing debates is beyond the scope of the present article. Nevertheless, these debates once again underscore that, although there is a degree of consensus concerning the questions that must be addressed, the answers remain far from settled.

In sum, this leaves us with a bottom line similar to the one from the previous section: Identifying the cognitive mechanisms that ultimately lead to biased judgments remains a thorny issue. And again, this is not so much because it is difficult to identify potential cognitive processes that contribute to biased judgments, but rather because it often remains elusive, which processes are at work in a given context and how they possibly interact with each other.

Known Unknown #3: Is a Biased Judgment the Result of Motivated Reasoning?

Motivated reasoning processes result in a biased judgment – which has been operationalized in a myriad of ways. For example, estimations of the strength and convincingness of a piece of information (Hutmacher et al., 2022, 2024; Kahan et al., 2017), judgments of the trustworthiness of a source and the credibility of evidence (Altenmüller & Poppe, 2024; Kahan et al., 2011; Kuru et al., 2017) as well as belief polarization in response to being confronted with certain information (Su, 2022; Sunstein et al., 2016) have all been used as indicators of motivated reasoning (for a critical evaluation of the paradigmatic designs, see Tappin et al., 2020).

No matter how bias is being operationalized, the core assumption behind motivated reasoning is that the bias is caused by an individual's *motivation to arrive at a particular conclusion*. In contradiction to this assumption, it has often been argued that the same pattern of results could also be obtained without directional goals playing a causal role. In short, what individuals *want* to be true is also what they *believe* to be true, resulting in an *observational equivalence problem* (Druckman & McGrath, 2019; see also Bayes & Druckman, 2021; Tappin et al., 2020). For the case of politically motivated reasoning, Ditto et al. (2025) summarize this problem as follows:

> Political partisans have both beliefs (priors) and affinities (desires). … Politically congenial information is consistent with both priors and desires. … Conversely, politically uncongenial information is inconsistent with both priors and desires. … The deep entanglement between priors and desires is what leads to the interpretational challenges faced by all research on partisan bias … When partisans more readily believe politically congenial than politically uncongenial information, it could be because politically congenial information fits better with their prior beliefs or because it confirms their desired beliefs." (pp. 9–10)

This kind of motivation-cognition debates has a long history that is not restricted to the case of motivated reasoning (see, e.g., Ditto, 2009; Kunda, 1990; Oeberst et al., 2025; Oeberst & Imhoff, 2023; Simon & Read, 2025; Tetlock & Levi, 1982; van Doorn, 2024; West & Kenny, 2011). Overall, it seems plausible to assume that an individual's bias is the result of a combination of motivated, directional goals *and* prior beliefs (Ditto et al., 2025). When investigating the results of human information processing, researchers therefore need to avoid two extremes (Hennes et al., 2020): They need to avoid perspectives that are "too hot" in the sense that they apply a motivated reasoning framework without convincingly demonstrating that motivation actually plays a role; at the same time, they need to avoid perspectives that are "too cold" in the sense that they underestimate or ignore the potential influence of motivational factors. Of course, developing a perspective that is "just right" is easier said than done.

From the perspective of basic research, this means that it will be important to develop paradigms in which it is possible to isolate the contribution of directional goals on biased information processing by controlling for the effects of prior beliefs either statistically or methodically. One attempt in this direction is provided in a recent study (Celniker & Ditto, 2024) in which participants indicated both their prior beliefs (e.g., whether they think that a certain policy is effective) and their directional goals (e.g., whether they oppose or support this policy) *before* evaluating the methodological quality of a fictitious study; crucially, it was also manipulated whether participants were blinded to the results of the study or not (i.e., whether they knew whether

the results of the study aligned with their beliefs and desires). In line with what was suggested above, the results indeed demonstrated that both directional goals and prior beliefs contributed to biased judgments (for similar attempts, see, e.g., MacCoun & Paletz, 2009; Stagnaro et al., 2023). Of course, one can still debate whether measuring directional goals and prior beliefs separately is enough to disentangle them. For instance, one might object that individuals hold their prior beliefs *because* they have certain directional goals (i.e., they state that they believe that something is true because they want it to be true) or vice versa (i.e., they want something to be true because they genuinely believe that it is true). However, such research designs at least provide a first step in the right direction.

From the perspective of applied research, keeping the potential contributions of prior beliefs *and* directional goals in mind means that it will be important to test which (combinations of) interventions for reducing information processing biases are most promising (for an overview of similar attempts in the context of misinformation countermeasures, see, e.g., Hoes et al., 2024; Kozyreva et al., 2024; C.-T. Ziemer & Rothmund, 2024). For instance, this could mean comparing interventions that focus on changing people's minds by providing them with additional information and targeting their prior beliefs (e.g., Coppock et al., 2018; Kuziemko et al., 2015) with interventions that address their motivations and worldviews (e.g., Esposo et al., 2013; Fielding et al., 2020).

Apart from the observational equivalence problem, there is another fundamental problem when it comes to the evaluation of biased judgements: No matter whether bias is regarded as the result of prior beliefs or motivated reasoning processes, the usual (but often tacit) assumption is that this bias is not merely a response tendency but a problematic deviation from the standards of rationality. Whether this is the case crucially depends on what one considers to be an appropriate standard of rationality. Broadly speaking, rationality can be defined as the quality of being guided by reason and logic to make decisions or form beliefs (see Sosis & Bishop, 2014). Hence, the key question is what being guided by reason and logic means in a given situation as this will determine whether bias is indeed *irrational*. With respect to rationality debates in the context of motivated reasoning, two perspectives can be distinguished (see van Doorn, 2025; for an overview of rationality debates, particularly in psychology, see Evans, 2021; Sturm, 2021; for an attempt to distinguish between truth and bias, see also West & Kenny, 2011).

The first perspective assumes that one's attitude roots are normally not formed arbitrarily but are based on a personal history and personal experiences as well as reasons and arguments. For instance, one is usually not a liberal or a conservative *just because*; one is a liberal or a conservative as one genuinely thinks and feels that this is the right way to see the world. If this is the case, however, it is – so the argument goes – perfectly rational to assume that preference-inconsistent arguments "are more likely to contain flaws, and that their flaws will be easier to recognize" (van Doorn, 2024, p. 5; see also Cusimano & Lombrozo, 2021; Kelly, 2008). Sometimes, this is also referred to as *ecological rationality* (Grawitch et al., 2025), which assumes that it is rational to keep one's judgments and decisions as simple as possible as long as this leads to sufficiently satisfactory choices. According to this line of thought, at least a *certain degree* of biased reasoning seems perfectly rational: While it may not be rational to completely dismiss preference-inconsistent information, it is conceived as rational to evaluate preference-inconsistent information more critically than preference-consistent information. That is, it can be rational to reject preference-inconsistent information unless it skews one's information processing *too much*. When transferring this line of thinking into a formal framework, this is usually done by referring to Bayesian reasoning, which assumes that new evidence is weighted against the evidence that an individual has previously encountered (see Baron & Jost, 2019; Druckman & McGrath, 2019; Kim et al., 2020; Taber & Lodge, 2006).

Apart from the debate whether the human mind follows Bayesian principles (cf. R. Bain, 2016; Rahnev, 2019), it can also be questioned whether the human mind *ought to* follow Bayesian principles, that is, whether information processing according to Bayesian principles is indeed an appropriate standard of rationality. To begin with, whether weighting new evidence against previously encountered evidence is a rational strategy depends on whether this previous evidence has been acquired in a rational manner. That is, if one's attitude roots are not as carefully constructed as suggested above, using them as a reference point when being presented with new information (e.g., scientific evidence) will inevitably lead to flawed conclusions. In other words, while evaluating preference-inconsistent information more critically than preference-consistent information may be rational as long as an individual's attitude roots are (mostly) based on true assumptions about the world, this asymmetric processing of information becomes problematic when it is not (see also Sommer et al., 2024). Indeed, there is reason to believe that an individual's attitude roots are not formed by passively absorbing information about the world, but by actively choosing what (sources of) information to trust (van Doorn, 2025), which would suggest that it is often not justified to take previously encountered information as a neutral and unbiased baseline against which to evaluate new information. Against this background, an alternative view of rationality – in contrast to the Bayesian view elaborated above – posits that the evaluation of a piece of information (e.g., with respect to the methodological rigor or the validity of an empirical investigation) should be independent from the question whether this piece of information is preference-consistent or preference-inconsistent. In short, the evidence is what it is – and people should treat it accordingly, no matter whether they like it or not.

The existence of such competing standards of rationality points to an important underlying issue: "How we determine the boundary line between rational skepticism and irrational bias is a critical normative question, but one that empirical research may not be able to address" (Taber & Lodge, 2006, p. 768; for an earlier formulation of the same

problem, see also Kruglanski & Ajzen, 1983). This normative issue is arguably further aggravated by an empirical issue: In many investigations of motivated reasoning, it remains unclear what an unbiased response pattern would look like (for some recent attempts to tackle this problem, see Celniker & Ditto, 2024; Hutmacher et al., 2024): When asking participants to state on a Likert scale how strong a certain piece of evidence is, for instance, it seems far from trivial (if not impossible) to decide what the correct response option would be. Similarly, when asking participants to list the strengths and weaknesses of preference-consistent and preference-inconsistent arguments – which might be a good way of gaining insights into the processes that lead to biased judgments –, there seems to be no correct number of strengths and weaknesses or a correct ratio of strengths to weaknesses.

Importantly, the insight that determining what is rational is a *normative question* is crucial from a theoretical point of view: First, because it indicates that researchers need to be explicit about the model of rationality that they subscribe to; and second, because it can prevent researchers from trying to solve a normative issue using empirical means. While empirical investigations can determine whether individuals follow Bayesian principles in a certain situation, these experiments will not be able to determine whether this is an appropriate way of reasoning. From a practical point of view, however, one might argue that the question about the rationality or irrationality of biased reasoning might not be that important after all: No matter whether we consider it rational to evaluate preference-consistent information differently than preference-inconsistent information from the perspective of the individual, the fact that this happens will always be problematic from the perspective of society. If the same evidence is interpreted differently by different individuals with different standpoints, this will impede the formation of a discourse in which individuals are willing to follow "the unforced force of the better argument" (Habermas, 1996, p. 305). According to this line of reasoning, even if it should indeed be rational to be a Bayesian, this would not diminish the severity of the problem that motivated reasoning researchers are trying to address.

Note that this is not an unanimously shared conclusion: So far, the (ir-)rationality of biased judgments was discussed in terms of *accuracy*, that is, the key question was whether biased judgments indicate a problematic deviation from optimal reasoning. However, the (ir-)rationality of biased judgments can also be discussed in terms of their *adaptiveness* (e.g., Rigoli, 2021; Sharot et al., 2023; for a related perspective, see also Cushman, 2020): From this perspective, the key question would be whether biased information processing and biased belief updating can contribute to maximizing individual and social utility. While adaptiveness might go hand in hand with accuracy in many cases, there is no necessary connection between the two. For instance, it has been demonstrated that optimistic biases regarding other individuals can foster cooperation (Castro Santa et al., 2018). In a similar vein, upholding a positive self-image may not only make people happier but may also enable them to convince others more easily and to keep pursuing their goals even in the face of adversity (see, e.g., Bénabou & Tirole, 2002, 2016; Sharot & Garrett, 2016). As much as introducing the adaptiveness of biased information processing as another potential benchmark to consider when discussing the (ir-)rationality of motivated reasoning can help to make the debate more nuanced, it cannot solve the normative questions raised above. While it is clear that the phenomenon of motivated reasoning draws much of its appeal from the assumption that it marks a deviation from the standards of rationality, what qualifies as (ir-)rational in a given context is likely to remain up to debate for the foreseeable future.

Conclusion

At first glance, motivated reasoning may appear to be a straightforward phenomenon. As it aligns so well with our everyday experiences, its existence seems almost self-evident: Most of us will relatively easily be able to recall a situation in which we felt that our conversation partner was simply unwilling to accept even the most unequivocal evidence and clung to their prior beliefs. At second glance, it quickly turns out that pinning down motivated reasoning is challenging, both from a theoretical and from an empirical perspective. In the following, we want to highlight four points.

First, the main reason that there are still many known unknowns regarding motivated reasoning despite several decades of research is not a result of poor science. It simply stems from the fact that it is difficult to disentangle the potential preconditions of motivated reasoning, to identify the specific underlying cognitive mechanisms, and to draw unequivocal conclusions regarding the motivational nature of the reasoning process on the basis of the observation that a judgment was biased (for a similar conclusion for the more specific case of motivated reasoning in the context of climate change, see Hennes et al., 2020). While the main goal of the present manuscript was to provide an overview of the three unknowns regarding motivated reasoning that we have identified, additional work remains to be done. For one, there are independent literatures associated with many of the concepts that were mentioned throughout the manuscript (e.g., self-concept, attitude roots, selective exposure, belief updating). Although we are confident that our literature search enabled us to detect the relevant publications from these research fields insofar as they make direct and explicit connections to motivated reasoning, delving deeper into each of these areas might hold additional insights. Moreover, we decided to focus on motivated reasoning in terms of directional motivated reasoning, mostly setting aside research on situations in which accuracy goals are strong and dominant. However, more explicitly contrasting reasoning and decision-making processes in situations in which accuracy goals are dominant and situations in which directional goals are dominant could additionally help to pin down the processes that lead to biased outcomes.

Second, and building on the previous point, we hold that research on motivated reasoning is *not* in need of new the-

ories or new concepts: The relevant questions are already on the table – which is why we have termed them *known* unknowns. What research on motivated reasoning requires is a better understanding of the existing theories and concepts, which is why we decided to write about known *unknowns*. In some cases, such as the isolation and identification of the preconditions of motivated reasoning or the specification of cognitive mechanisms leading to biased judgments, this might be achieved by improving study procedures and experimental designs. In some other cases, such as determining when a bias is irrational and when it is not, progress – at least in the empirical sciences – may be harder to achieve given the normative nature of the underlying questions. Importantly, this does not imply that these normative questions should be ignored. As noted above, researchers should at least be explicit about the model of rationality that they subscribe to in order to make interpreting and comparing studies easier and more transparent. Moreover, psychological research might benefit from looking beyond disciplinary boundaries in this regard, for instance by seeking exchange with philosophers. Such interdisciplinary cooperation could contribute to identifying and discussing the diverging viewpoints more clearly.

Third, the idea that theorizing on motivated reasoning needs to be improved fits well with the overall notion that academic psychology is suffering from a theory crisis (Eronen & Bringmann, 2021; Oberauer & Lewandowsky, 2019). One solution that has been proposed for addressing this crisis is formalization (e.g., Guest & Martin, 2021; Oberauer & Lewandowsky, 2019). Interestingly, there have been some attempts at formalizing theories of motivated reasoning, especially in the field of economics (e.g., Bénabou, 2015; Bénabou & Tirole, 2002). Although we acknowledge the value of formalization as a tool for theory building in psychology, we also want to emphasize that successful formalization requires robust phenomena and well-defined concepts (see Bringmann et al., 2022; Hutmacher & Franz, 2025). As we have pointed out, however, especially the latter is something that is still missing in the field of motivated reasoning. In the context of the theory crisis, one might also think of the closely connected replication crisis that has led to profound changes regarding the way psychological research is conducted (for an overview, see, e.g., Nosek et al., 2022). This raises the important question as to what degree one can still trust findings from several decades ago that were not produced under the same standards. Interestingly, the basic motivated reasoning effect has been replicated over and over again across different contexts, study designs, materials, and measures, suggesting that motivated reasoning is a very stable and robust phenomenon (see also the first point in this conclusion). Where available, the more recent evidence also seems to be in line with the findings obtained in earlier studies (see, e.g., the meta-analytic evidence regarding selective memory retrieval by Eagly et al., 2001, and the more recent empirical investigation by Vedejová & Čavojová, 2022, discussed above). These encouraging observations notwithstanding, we believe that the field of motivated reasoning research would benefit from more systematically replicating some of its core findings and especially from developing paradigms that can overcome the limitations of previous study designs. Although we have made some suggestions in the respective sections as to how this could be done, there is still ample room for creative and at the same time rigorous research.

Fourth, the three known unknowns that we mentioned in the present manuscript concern the most fundamental aspects of motivated reasoning: Without an identification of the preconditions of motivated reasoning and the mechanisms that lead to biased judgments, and without being able to determine whether biased judgments are the result of motivated reasoning or other processes, our understanding of motivated reasoning will necessarily remain incomplete. However, this does not imply that there are *only* three known unknowns in the context of motivated reasoning. For instance, and as briefly mentioned above, the degree of motivated reasoning may depend on a host of individual differences and contextual factors (see, e.g., the debate about the role of deliberation; Hutmacher et al., 2025; Pennycook & Rand, 2019). Exploring such boundary conditions was beyond the scope of this paper. Nevertheless, we encourage additional work tackling the known unknowns in this regard as well.

In sum, even for those researchers who have criticized the current state-of-the-art as ambiguous and unsatisfying, this does usually "not imply that reasoning is unaffected by motivation" (Tappin et al., 2020, p. 85). Quite undoubtedly, motivated reasoning *is a thing*. What we need, is more research to find out what thing it is *exactly*. To know what kind of research to conduct, however, it is crucial to clarify the phenomenon under investigation and to identify the sticking points that have repeatedly bugged scholars interested in motivated reasoning. This is what we have tried to do in the present paper.

Author Contributions

All authors contributed to the conceptualization of the manuscript. FH drafted the manuscript. RR and MSA provided comments and suggestions and edited the manuscript. All authors approved the final version of the manuscript.

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