

Non experts: which ones would trust you?

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Following Goldman's seminal work, most contemporary philosophical contributions on the novice-expert relation have adopted a normative, expert-focused approach. In this paper, we aim to shift the focus of the philosophical analysis towards the characteristics of the novices, and how they might determine the choices that experts make. On the bases of recent empirical evidence from social psychology, we discuss how novices evaluate the messages that they receive and distinguish diverse kinds of novices according to their competence in message assessment. Building on that analysis, we discuss the difficulties of approaches to expertise that focus only on the standpoint of novices or assume novices are homogeneous. In our analysis, we introduce the standpoint of experts, and we pay special attention to the heterogeneity of novices. This approach allows us to identify and address the difficulties faced by experts in the context of science communication. In the last part of the paper, we characterise and discuss the problem of experts when choosing a strategy in the issuing of a public campaign to advice or inform certain population of novices.

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1. Introduction

In the last couple of decades, we have seen an important growth in the philosophical

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attention given to the issue of expertise. The COVID-19 health crisis has amplified this trend and contributed to extend it to the public sphere. References to experts (and expertise) have been ubiquitous in the public debate regarding the measures to slow the spread of the disease. For example, throughout the many stages of the pandemic, governments around the globe have claimed to act on the basis of experts' advice, while there have been different public controversies regarding the relative relevance of medically trained experts over social scientists (Smith 2020).

The centrality of the notion of expertise in these academic and non-academic debates is hardly accidental. Expertise is a notion that encapsulates well the socially stratified distribution of scientific knowledge and the complications of the relations between scientists and the public, where trust is central. In the philosophical study of this notion, Alvin Goldman's (2001) work, both for its content and its timing, is considered a milestone, as Goldman's criteria of expert assessment provided the basis for the contemporary philosophical debate on expertise. Nonetheless, we argue that Goldman's approach also framed some of the questions regarding the relation between the experts and the public in ways that can obscure relevant aspects of this relationship. As we will highlight below, Goldman's framework assumes that novices tend to be reliable and pays little attention to their heterogeneity. While Goldman himself did not aim at providing a comprehensive framework, the fact that his work has framed the subsequent debate means that these aspects remain little understood.

In this paper, we want to shift the focus of the philosophical analysis towards the characteristics of the novices and how they can influence the choices that experts make when presenting their claims. We consider that this approach allows us to illuminate and address important challenges in the context of novice-expert relations, which are overlooked by previous contributions. Our proposal aims to bridge a gap between two

different literatures that would benefit from further integration. On the one hand, we consider the recent literature on expertise, which has typically taken a mostly normative, expert-centred approach. Here, the central issue revolves around the question of how can (perfect) novices find the right experts (see, for instance, Martini [2014, 2015]). On the other hand, in the literature on mass persuasion, denialism, and anti-science movements, we often find analysis of how (imperfect) novices choose the wrong experts (see, for example, De Cruz [2020]).

The structure of the paper is as follows. Section 2 presents Goldman's criteria of expert assessment and discusses some recent contributions that have addressed the novice/expert problem from a Goldmanian perspective. We argue that this literature is, following Goldman's foundational work, characterised by a normative, expert-focused approach. Section 3 discusses the social psychological evidence on the mechanisms of message assessment. We then apply this empirical evidence to the way novices assess the messages they receive from experts. On the basis of the mechanisms of message assessment, section 4 identifies different kinds of novices attending to their competence. We distinguish novices according to their competence for assessing the content and the source of messages. Section 5 introduces a novice-focused approach to the novice-expert relationship, which highlights the dilemmas faced by experts and acknowledges the heterogeneity of novices. The expert/2-message problem, a particularly relevant dilemma, is analysed in detail. Section 6 illustrates the expert/2-message problem by means of a simple model in which (diverse) messages about complex scientific ideas are issued to heterogeneous populations of novices. Section 7 concludes.

2. Assessing expertise

In his influential 'Experts: Which Ones Should You Trust?' (2001), Goldman addresses

the evaluation of the testimony of putative experts by laypeople or novices, i.e., the novice/expert problem. He aims to develop a framework that takes into account the epistemic and practical limitations of laypeople. Goldman focuses on those cases in which a layperson has to ‘choose one putative expert as more credible or trustworthy than the other with respect to the question at hand’ (Goldman 2001, 92). He identifies this particular scenario as the novice/2-expert problem.

In order to discriminate between the conflicting putative experts, Goldman identifies several sources of secondary evidence that a novice can gather without acquiring any knowledge in the domain of expertise, that is, without themselves becoming an expert. He considers that certain properties of the speaker provide crucial evidence for the overall entitlement to accept their claim. The sources of secondary evidence are:

- (A) Arguments presented by the contending experts to support their own views and critique their rivals’ views.
- (B) Agreement from additional putative experts on one side or other of the subject in question.
- (C) Appraisals by “meta-experts” of the experts’ expertise (including appraisals reflected in formal credentials earned by the experts).
- (D) Evidence of the experts’ interests and biases vis-à-vis the question at issue.
- (E) Evidence of the experts’ past “track-records”.

(Goldman 2001, 93)

Source (A) considers the argumentative performance of the putative experts. Indirect argumentative justification plays an important role here. While many statements may be epistemically inaccessible to the novice, dialectical superiority over the opponents, which is considered to be a plausible indicator of greater expertise, can be identified by them. Source (B) refers to the number of putative experts supporting a claim and the degree of consensus among all relevant putative experts. Source (C),

which is closely related with (B), focuses on other experts' (or 'meta-experts') assessments of the contending agents. Both (B) and (C) are considered to require that the involved putative experts are (partially) mutually independent. Otherwise, greater numbers would hardly add further credibility. Source (D) considers the presence of vested interests and biases. These influences may be widespread in the discipline or characteristic of certain putative experts. Finally, source (E) takes into account the past track record of success in the relevant domain. It should be noted that, over time, putative experts' statements may become exoteric and their truth-value more accessible to novices.

Goldman claims that this list of sources of evidence, although by no means exhaustive, provides a criterion for justifiably accepting the testimony of certain putative expert. While he offers no details on how the diverse sources of evidence should be aggregated, the basic intuition seems to point to a straightforward strategy: a novice should accept the claim of the putative expert that scores higher in A, B, C and E and is not likely to be biased (D).²

Goldman's work, which has the merit of having appeared before the question of scientific expertise became central to the discussions in philosophy, has shaped the philosophical debate about the novice-expert relationship.³ In the last twenty years, several works have explored the question of expertise in the light of his characterisation of the novice/2-expert problem. Those contributions tend to display two traits that they inherit from Goldman's proposal. First, in order to study the novice-expert relation,

² As it came up in the reviewing process, this is but one possible interpretation. A different interpretation of the aggregation of these criteria can be found, for example, in Martini (2019) and Martini and Andreoletti (2021). Under this interpretation, those criteria identify 'proxies' for expertise and provide the basis for estimating the expertise of a putative expert. It is considered that, under normal conditions, high levels on these (and other that might be missing) criteria combined correlate with a high degree of expertise.

³ It should be noted that, although much of the current discussion on the matter revolves around Goldman's timely contribution, many relevant philosophical analyses of expertise preceded Goldman's work (see, for instance, Crease and Selinger [2006]).

these works put the focus on the characteristics of the expert and overlook those of the novice. Second, and relatedly, in trying to assert the characteristics that an ideal expert should have, they tend to adopt (though not always explicitly) a normative stance rather than a descriptive one. The debate is, therefore, characterised by the development and discussion of normative guidelines for expert assessment.

A representative example of the contemporary research on expertise is provided by Carlo Martini's work. In his 'Experts in Science' (2014) piece, Martini analyses the most widespread criteria of expertise and suggests possible adjustments on the bases of actual scientific practice. His main aim is to develop an approach that can have a role in concrete scientific applications. Related to this, Martini's 'Expertise and Institutional Design in Economic Committees' (2015) underlines the relevance of developing a theoretical background that allows us to select, evaluate, and weight the principles of expert assessment. In so doing, he identifies two kinds of expert committees, i.e., type-1 and type-2 committees. Type-1 committees have complex and one-time mandates, while type-2 committees have simpler and recurring mandates.

In the contemporary debate on expertise, other authors have also attempted to update Goldman's approach by incorporating new tools developed in nearby fields. Walton (2016), for instance, explains how novices should use argumentation tools to analyse and evaluate arguments provided by putative experts. He pays special attention to the new formal and computational models of argumentation (e.g., the Carneades Argumentation System). Brennan (2020), building on the literature on metacognition, introduces guidelines for ensuring a reliable application of the criteria of expert assessment.

As it has been noted, despite the normative character of the debate, some authors adopt a practically oriented approach to the criteria of expertise and aim to develop

proposals applicable in non-ideal conditions. In this sense, some contributions have assessed the application of the criteria of expertise in concrete real scenarios.

Anderson (2011) evaluates the application of the criteria for lay assessment of scientific testimony to the controversy over the anthropogenic climate change. She considers to what extent relevant second-order evidence can be achieved by laypeople with internet access and basic research skills. Anderson argues that, in that case, laypeople would be able to make reliable assessments of whom to believe. For example, attending to epistemic-responsibility aspects, they can find that denialists evade peer-review and show dialogic irrationality.

Martini (2015) assesses the application of criteria of expertise to the Boskin Commission, which is a paradigmatic type-1 committee, and the Bank of England's Monetary Policy Committee (MPC), which is a paradigmatic type-2 committee. The Boskin Commission was invested in 1995 by the US Senate to reassess the methodology for measuring the inflation rate. On the other hand, since its creation in 1998, the MPC meets at monthly intervals to adjust the monetary policy of the Bank of England to keep the inflation below a specific target fixed by the government. Martini argues that while criteria such as representativeness and objectivity can be used to assess the labour of the MPC, they are hardly adequate for assessing the Boskin Commission. The open nature of its mandate makes demands such as pursuing advice seeker's goals or presenting explicit and conclusive evidence very difficult to apply.

In sum, following Goldman's framework, the philosophical discussion about the novice-expert relation has focused on one end of this relation, i.e., experts. Though this literature is also concerned with the real-world conditions in which novices must find the best available experts, most of the contributors therein have adopted (also following Goldman) a normative approach: they have for the most part focused on providing the

criteria whereby novices should go about identifying true experts. In so doing, these works, again, following Goldman's approach, have assumed that novices are competent and unbiased. While experts can vary in their degree of competence or moral compass, Goldmanian novices always behave ideally (within the constraints resulting from their knowledge limitations regarding the involved scientific domain). In the next section, we try to contrast this idealised view of the novice with the available evidence. This contrast is driven by two different but related questions: (1) how do 'real-world' novices behave? and (2) does the behaviour of 'real-world' novices cohere with the (normative) principles introduced by Goldman?

3. The behaviour of novices

There is not, to date, a systematic empirical account of the ways in which novices choose the experts they trust. The question has not been tackled directly. However, there is ample empirical evidence regarding how people assess the messages that they receive from others. In particular, we argue that Hugo Mercier's recent contributions to the issue of mass persuasion and the extent of gullibility of the public can be brought to bear on the issue of whether novices act in ways similar as those prescribed by Goldman's proposal.

Mercier (2020) has extensively reviewed evidence on message assessment and developed a framework that portrays human communication as characterised by open vigilance. On the one hand, humans are open to many forms and contents of communication. They can use a great variety of signals (e.g., writing) to communicate about almost anything they can conceive (e.g., abstract entities). On the other hand, humans are vigilant regarding those diverse forms and contents of communication.

Openness makes them more vulnerable (e.g., they often face unknown signals), so more vigilance is required.

According to Mercier's framework, humans have evolved from a situation of extreme conservatism, where only a restricted and reliable set of signals affected them, toward a situation in which they are more open to different forms and contents of communication. For this reason, they have also become more vigilant: openness and vigilance evolved hand in hand as human communication became increasingly broad and powerful. Once humans become cognitively more complex, some default safeguard mechanisms remain active in vulnerable contexts. Mercier argues that when humans' more recent and sophisticated cognitive machinery is disrupted (e.g., they are too tired to be effectively vigilant), they revert to their conservative core (i.e., no openness). In those cases, humans resort to becoming more stubborn, rather than more gullible.

On the basis of his review of the vast available evidence on the matter, Mercier (2020) identifies several mechanisms of message assessment—which he calls 'mechanisms of open vigilance'—that humans have developed to deal with the potential but also with the danger of communication. Some mechanisms are related to the content of the message while others are related to the source of the communicated information:

Content

- *Plausibility checking.* Messages are evaluated in the light of pre-existing beliefs and knowledge. Humans are more likely to accept those messages that suit their pre-existing views.
- *Reasoning.* Arguments in support of the message are evaluated in the light of pre-existing inferential mechanisms. Strong arguments increase the acceptance of the message, even when it involves challenging conclusions.

Source

- *Informational access.* Access to the information is relevant in order to accept others' claims. People are more likely to accept a message if the source has a (more) reliable access to the relevant information.
- *Past performance.* Previous performance of the source is important in order to accept a message. People are more likely to accept a message if the source has been consistently right in its claims in the relevant domain.
- *Majority rule.* The position of the majority regarding a claim is relevant to accept it. People are more likely to accept a message if it is supported by the majority.
- *Relative diligence.* The effort made in providing valuable information is related to the trust placed in the source and the acceptance of the message. When the source is likely to be diligent (e.g., aligned incentives), people trust it and take its opinion into account more.

The mechanisms identified by Mercier are at the basis of people's message assessment practices. So, for example, when we read and consider a review of a new cultural product, those mechanisms are often at work. On the bases of our pre-existing views and inferential mechanisms, we consider the content of the review. For example, we evaluate if it suits our previous ideas about the author. Furthermore, we also assess the source of the information. We consider, for instance, the accuracy of its previous reviews or its agreement with other relevant sources.

[Table 1]

Put next to each other (see Table 1), it becomes apparent that there are important parallels between the mechanisms identified by Mercier, which aim to account for people's practices vis-à-vis message assessment, and the criteria proposed by Goldman

(and adopted by many others), which aim to guide novices' practices vis-à-vis their choice of experts. The similarities between Goldman's 'normative criteria' and Mercier's 'descriptive mechanisms' are most evident in some cases. Consider, for instance, the criterion of past track-record and the mechanism of past performance. Both focus on the previous performance of the source in the relevant domain. They assess its past success rate for similar questions. There is also a clear parallel between the criterion of agreement from additional experts and the majority rule. They focus on the acceptance of the message among the involved agents and, in both cases, special attention is given to the degree of consensus and (conditional) independence.

There are also other, if perhaps less obvious, parallels between these two approaches. Both Goldman's criterion of argumentative justification and Mercier's mechanisms for plausibility and reasoning focus on the content of the message. According to Goldman's argumentative justification, the novice has to evaluate the arguments provided by putative experts in support of their claims. That evaluation, given standard practical limitations (e.g., temporal limitations), needs to be based on pre-existing knowledge and inferential mechanisms, congruent with Mercier's depiction. Equally, examining Goldman's criterion of interests and biases, we can see it as related to Mercier's mechanism of relative diligence: both of them assess the trustworthiness of the source of the message. In this case, while relative diligence focuses on the interests of the source, Goldman's criterion underlines the relevance of both interests and (unconscious) biases.

While mechanisms of message assessment are indeed universal and they seem to provide the (or at least, a) basis for expert evaluation, there is also, nonetheless, ample evidence of systematic departures from the ideal of open vigilance. These departures, rather than being random and scant exceptions to the 'open vigilance norm', often seem

to display sociologically or culturally determined patterns (see, for instance, Muthukrishna et al. [2018]). The adoption of inaccurate (and the refusal of accurate) science-related messages has lately received greater attention from philosophers of science, as their visibility seems amplified by recent developments (e.g., new forms of mass communication) and political movements (e.g., denialists responses to the COVID-19 health crises). In a recent paper, Martini and Andreoletti (2021) characterise and analyse bogus scientific controversies (e.g., manufactured disagreements), which often hinder scientific progress and erode laypeople's acceptance of certain scientific claims. In this way, and beyond trying to understand how novices often 'get it right' in their attempts to look for adequate experts, there is also the need to explain why significant groups of people resort to anti-science gurus, or how they are sometimes seduced by putative experts that are linked to climate change denialism or other forms of pseudoscience. These movements seem to display attitudinal regularities that also call for attention or explanation, which we think can be tackled by focusing not only on the varieties of experts, but also, on the different types of novices.

Summing up, the evidence collated by Mercier suggests that people assess messages guided by mechanisms that resemble the principles of expert evaluation introduced by Goldman. At the same time, there is evidence of systematic departures from the ideal of open vigilance. These findings conflict with the idealised and, in certain sense, opaque notion of novice introduced by Goldman. We contend that it is important to expand the philosophical focus beyond the characteristics of experts. It seems crucial to also look into the characteristics of novices and how these characteristics may be distributed among the population in ways that can give rise to relevant behavioural patterns. In the next section, and on the basis of the discussed

mechanisms of message assessment, we identify different kinds of novices according to their competence.

4. Kinds of novices

As it has been noted (see section 2), the philosophical debate about the novice-expert relation has paid special attention to the characteristics of experts and the different types of expertise that they can give rise to. For instance, Martini (2015) studies committees of experts and distinguishes between two kinds of them: type-1 and type-2 committees. That classification is proposed as a reference for guiding and evaluating expert assessment. Another illustrative example is provided by Angner (2006), who addresses the role of economists as experts. He focuses on overconfident economists and the potential for harm in their relation to novices (e.g., misguided policy decisions).

Nonetheless, less attention has been paid to the variety and diversity of novices. In this way, in the relevant literature, and by assuming away the possibility that novices also differ amongst themselves, it is often implicitly assumed that novices are homogeneous regarding their capacities, biases, interests, etc. This lack of attention to novices' diversity is regrettable because, as we will argue, it can result in overlooking cases in which laypeople are likely to err in their assessment of (messages from) experts. These include cases where novices fall prey to pseudoscience or other forms of disinformation. We instead want to explore the diverse kinds of novices and see how, by acknowledging this diversity, it is possible to shed light on the novice-expert relation. In the present section, taking as reference the mechanisms at the basis of

human communication, we distinguish different kinds of novices according to their competence to assess messages (in a given domain).⁴

In our account, first, we distinguish between competent and incompetent novices. *Competent novices* are those whose mechanisms of message assessment tend to result in accurate judgements regarding expert advice.⁵ They are thus trustworthy regarding the evaluation of both the content and the source of the message. As we have mentioned above, competent novices are often (implicitly) taken as reference—at the expenses of other types of novices—in the philosophical discussion about the novice-expert relation. Consider, for instance, the foundational work by Goldman (2001). While novices have no in-depth knowledge about the relevant scientific domain and cannot understand some (esoteric) arguments involved in the scientific debate, they are however expected to be able to provide accurate evaluations of those aspects of the discussion (e.g., dialectical superiority) and the sources (e.g., credentials) to which they have access.

Incompetent novices are those whose mechanisms of message assessment do not tend to result in accurate judgements regarding expert advice. This can happen because their own mechanisms of message assessment have relevant limitations that undermine their reliability (thus, through internal sources of inaccuracy) or because they are interfered or counteracted by other mechanisms (external sources of inaccuracy). Regarding internal sources of inaccuracy, consider cases in which mechanisms of message assessment are damaged or incomplete and thus provide imprecise evaluations.

⁴ In this paper, we mainly focus on the epistemic characteristics of novices. Nonetheless, as a reviewer brought to our attention, novices can also be classified along sociocultural traits (e.g., social values), which may significantly influence message assessment. An exhaustive taxonomy of novices should also take sociocultural factors into account.

⁵ As pointed out by one of the reviewers, in the limit, a competent novice that has sufficient knowledge could become an ‘interactional expert’ (Evans and Collins 2010). An interactional expert is a person that, although lacks contributory expertise in certain domain, is able to interact interestingly with the participants in the relevant scientific debates.

You may consider, for example, novices that manifest overconfidence, who are likely to miscalibrate messages (Meikle, Tenney, and Moore 2016). Overconfident novices tend to give excessive weight to their pre-existing beliefs and understate those cues that support alternative ideas. In those cases, mechanisms such as checking plausibility or majority rule have significant limitations and often provide inaccurate assessments.

There are also cases in which some mechanisms of message assessment are counteracted or even completely masked by other mechanisms. In those cases, those disturbing mechanisms may affect the evaluation of certain aspect of the message and result in an inaccurate judgement. Pseudoscientific movements (and other forms of disinformation) constitute an important source of external interference in message assessment. To illustrate this point, consider the denialism on the causal link between tobacco and lung cancer (Proctor 2011). In that case, despite the broad consensus among experts, the tobacco industry—by means of the Tobacco Institute and other institutions—devoted a great deal of effort and resources to convincing laypeople that the link between tobacco and lung cancer was subject to a genuine scientific controversy.⁶ In that scenario, even if a novice’s mechanism of majority rule is reliable, they would hardly be able to make an accurate estimation of the consensus among the involved experts. Their considerations would also be influenced by the misleading claims by denialists.⁷

We also consider that different kinds of incompetence can be identified attending to which aspects of the message are not properly assessed. Thus, it is possible

⁶ Fabrication of fake controversies is just one of the strategies by means of which science denialism might undermine message assessment (Hansson 2017). Other relevant strategies are cherry-picking of data, misrepresentation of denied claims, and deviant criteria of assent.

⁷ Martini and Andreoletti (2021), who address scientific controversies, propose a heuristic strategy for identifying bogus versus genuine scientific debates. This strategy, which relies on secondary evidence about discordant sources (e.g., authors’ field of expertise), could mitigate the impact of bogus controversies on message assessment.

to distinguish among content incompetence, source incompetence, and content-and-source incompetence. First, in *content incompetence*, mechanisms related with the content of the message do not provide accurate judgements. That kind of incompetence is often related to internal sources of inaccuracy. The reliability of those mechanisms usually varies through the novice population. To illustrate that point, consider the reasoning capabilities of novices. Their reasoning capabilities for a given problem depend on the inferential mechanisms previously grasped. The wider and deeper knowledge on inference-making, the more precise the evaluations that a novice will have on a given issue. Nonetheless, while some novices may be familiar with complex inferential mechanisms around a given issue, others may only have very general and vague ideas on the subject. Representative examples of this type of content incompetence can be found more often among people that have had limited access to education, since formal education has a crucial role in the acquisition and development of inferential mechanisms (Gamino et al. 2014; Klahr, Zimmerman, and Jirout 2011).

Second, in *source incompetence*, mechanisms related with the source of the message do not provide accurate judgements, as when negative affect towards a sender makes us unduly dismiss their message. This kind of incompetence is particularly affected by external sources of inaccuracy. Source-related mechanisms are crucially important to our daily lives and are present even in certain non-human animals (see Conradt and List [2009]). Nonetheless, in some scenarios, source-related mechanisms may be counteracted by disturbing mechanisms. Affective or identity considerations can be responsible for cognitive biases that undermine the assessment of the source. In politically polarised contexts, for instance, novices' views may influence (and eventually distort) their considerations about the source of the message. Political

polarisation often causes animosity toward opposing partisans and results in discriminatory behaviour toward them (Iyengar and Westwood 2015).

Finally, both kinds of mechanisms of assessment can fail or be countered at once to produce *content-and-source incompetence*. For example, consider vaccine hesitancy. Most of the people that refuse vaccination have difficulties in assessing both the content and the source of the public health campaigns. They do not only face problems in evaluating claims provided in support of the efficacy and safety of vaccines (Finney Rutten et al. 2021), but also (given their worldviews) for considering the reliability of the involved public agencies (Soveri et al. 2021).

In summary, taking as reference the cognitive mechanisms at the bases of human communication, it is possible to identify different kinds of novices regarding their competence to assess messages. For any given domain, novices can be classified in a continuum of competence with extremes defined as competent and incompetent, respectively. Regarding incompetence, it is possible to distinguish among content, source, and content-and-source incompetence. This analysis and categorisation contribute to acknowledge and account for the heterogeneity of novices and their divergences in the relationship with experts. In the next section, we introduce and discuss an approach to the novice-expert relation that adopts the standpoint of experts and takes into account the heterogeneity of novices.

5. A novice-focused approach to the novice-expert relation

As the previous analysis highlights, current approaches to the novice-expert relation—which have been shaped by the foundational work by Goldman—are frequently characterised by two main traits. First, to a large extent, this type of research focuses on the dilemmas faced by novices. It aims to identify, analyse, and provide guides for the

main problems that novices encounter when choosing who to trust, e.g., the novice/2-expert problem. And second, this type of approach has devoted its attention to the heterogeneity of experts, their pathologies, and the ways in which novices can try to discriminate between them. In order to provide a guide for novices, the different kinds of experts are characterised and the traits that give clues for their assessment are discussed. In the last two decades, this approach has proved to be very valuable, and our understanding of the novice-expert relation has significantly increased.

This type of scheme, however, needs to be complemented with other proposals that include the aspects not covered by the Goldman's approach. This, we contend, would help us to identify and address relevant problems in the context of novice-expert relations. In particular, we consider that an approach that (i) adopts the standpoint of (committees of) experts and (ii) takes into account the characteristics of (the diverse kinds of) novices can offer helpful insights. This kind of novice-focused approach to the novice-expert relation can illuminate the problems faced by the experts in their relations with novices.

In the context of science communication, experts have to make several crucial decisions concerning the issued message, the medium of communication, the target population, the presented credentials, etc. These different decisions are, of course, interrelated. The position adopted regarding one of the issues conditions the approach to the others. For example, if the target population is retired older folk, the message needs to be geared in a language that is understandable to this demographic group but additionally, social networks popular mainly among younger people might not be an optimum medium for the message. In a similar sense, the sociocultural traits of the target population may determine which experts should play a leading/spokesperson role

in the interaction with novices. Those experts that share relevant sociocultural traits (e.g., social class) with novices, given the influence of homophily, are expected to be more persuasive (McPherson, Smith-Lovin, and Cook 2001).

The novice-focused approach provides a helpful framework for addressing these communication issues. To make a sensible and informed decision in the context of science communication, it is crucial to consider the nature and composition of the relevant population of novices. Epistemic and sociocultural particularities of novices may have a crucial influence in the reception, assessment, and acceptance of science-related messages. This approach considers the diverse kinds of novices that constitute the population and how they behave in the context of novice-expert relations. In this sense, it provides a valuable input for the experts' decision-making process. The proposed approach is in line with, and provides a general framework for, recent contributions to the novice/expert problem that focus on certain kinds of novices. For instance, De Cruz (2020) analyses the behaviour of novices in those contexts in which scientific theories are politically polarised. She also explores diverse strategies that could be adopted to deal with denialism in that kind of context, e.g., benevolent testifiers that belong to the audience's community.

One particularly relevant dilemma faced by experts in the context of science communication comes from the fact that, for reasons of credibility, a given expert may be limited to issuing only one message (or a set of coherently related messages) even when they realize that the novice population that they face is highly heterogeneous. The idea is that, in the issuing of a public campaign to advice or inform certain population of novices about a relevant scientific issue, an expert might realize that there are different optimal messages to be addressed to differently competent novices, but they can also be constrained by the need to be perceived as credible, and thus may only be able to

(credibly) issue one message. Otherwise, they risk being viewed as inconsistent. We call this type of dilemma the *expert/2-message problem*, and it offers, in some partial, limited sense, a mirror image to the Goldmanian novice/2-expert problem.⁸ In the expert/2-message scenario, both the target population that receive the message and the addressed scientific issue are previously established; the role of the expert is restricted to the design of the public campaign to advice or inform the novices. But because the pool of novices can be heterogenous, the message that is finally chosen by the expert might involve trade-offs. For example, a message that is best addressed to content incompetent novices may alienate competent novices and vice versa, yet, for reasons of credibility, issuing diverse campaigns that overlap in time is not a reasonable mode of action.

To illustrate the expert/2-message problem, let us briefly consider the public campaigns about mask wearing during the COVID-19 health crisis. In the first stages of the pandemic, evidence on the effectiveness of masks in preventing transmission of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was scarce (Greenhalgh et al. 2020). Furthermore, most available observational evidence focused on previous epidemics of influenza (see, for instance, MacIntyre et al. [2009]) and did not consider the particularities of this new (and almost unknown) virus. In the following months, however, the evidence in support of mask wearing grew and masks were shown to be a safe and effective tool to reduce the spread of the disease among the population (Czypionka et al. 2020). Nonetheless, although the overall utility of masks in slowing the spread of the disease became clear, the evidence about mask wearing was

⁸ In the present discussion of the expert/2-message problem, for the sake of argument, we will assume that the expert has the best available knowledge on the relevant matter and is diligent. Those cases in which the putative expert is not competent or trustworthy are beyond the scope of this first exploration. Nonetheless, we suspect that the previous work following the Goldman's approach, which pays special attention to the pathologies of experts, will provide valuable resources for addressing those complex scenarios.

complex and required complex reasoning and guidelines if they were to be used properly. For example, the material and the fit of the mask have an important impact on the degree of protection offered (Clapp et al. 2021; O’Kelly et al. 2021).

In this scenario, experts working for different levels of government and public agencies needed to issue campaigns aimed at promoting mask wearing but there were many different communication strategies available that could either entice or alienate different sets of the population. Around the world, different public campaigns about masks were carried out. Some campaigns were very simple and just encouraged the use of masks. In this sense, the ‘Whatever Your Reason, Get Behind the Mask’ campaign by the State of North Carolina and the ‘Face it. Masks Fight COVID-19’ campaign by the State of Tennessee focused on highlighting the diverse personal reasons to wear a mask (e.g., helping local business). Nonetheless, other campaigns were more elaborate and provided guidelines for the appropriate use of masks. For example, the ‘How to Properly Wear a Face Mask’ campaign by the UC San Diego Health provides details about how and when (in their facilities) masks should be worn. Additionally, different expert committees in different countries opted for different strategies regarding mask wearing. Some politics introduced universal and strict, yet simple rules. This was the case in Spain and Italy, where people were obliged to wear masks at all times, including outdoors. In the United Kingdom, however, the government followed a more discriminating strategy, which made masks compulsory only indoors.

In each particular context, for identifying the appropriate kind of message, it seems that the particularities of the target novice population were (or should have been) a crucial reference. In this sense, some simple recommendations encouraging mask wearing can be seen as responding to the institution’s (or experts’) beliefs regarding the target population. For example, they may have considered that there are important

pockets of population that would not be able to understand complex messages about mechanisms of transmission and the use of masks. Similarly, when complex messages were issued, the institutions or experts may have considered that relevant groups in the population may be alienated by simplistic messages advising the use of masks at all times, even when they will not serve clear purposes (as when going for a walk on one's own).

There are important parallels between the expert/2-message problem and the novice/2-expert problem introduced by Goldman (2001). Both problems address the choice among several (and mutually exclusive) options in the context of novice-expert relations. Furthermore, in both cases the heterogeneity of the involved agents is an important aspect and plays a crucial role in the election. Nonetheless, there are also relevant differences between them. While the novice/2-expert problem adopts the perspective of novices and considers the diverse traits of experts (in order to guide novices' choice of expert), the expert/2-message problem adopts the perspective of experts and considers the diverse traits of novices (in order to guide experts' choice of message).

Summing up, on the basis of the discussion on novices, it is possible to develop a novice-focused approach to the novice-expert relation. This approach is characterised by focusing on the dilemmas faced by experts and paying special attention to the traits of the involved novices. One important dilemma faced by experts is the expert/2-message problem. In that scenario, the expert has to choose a message to advice or inform certain population of novices about a relevant scientific issue. In the next section, by means of a simple model, we will illustrate the relevance of considering the traits of the target novice population in order to select the adequate kind of message.

6. Illustrating the expert/2-message problem

In order to illustrate and explore the expert/2-message problem, we present a simple model in which (diverse) messages about complex scientific ideas are issued to heterogeneous populations of novices. The model presents the dilemmas that a benevolent competent expert faces when presented with a heterogenous target population.

Novices are distinguished according to their capacity to assess messages. We can think of this capacity as organized along the dimensions of reasoning competence and source-evaluation competence:

- *Reasoning competence.* Reasoning competence focuses on the *content* of the message (see section 3). For simplicity, we can assume that novices can be divided into two groups regarding their reasoning competence. High reasoning competence means that the novice is able to (i) understand both complex and simple messages and (ii) identify inaccurate messages on the bases of previously known inferential mechanisms. Low reasoning competence, on the other hand, means that the novice is unable to (i) understand complex messages (only understands simple messages) and (ii) identify inaccurate messages.
- *Source-evaluation competence.* Source-evaluation competence is related with the mechanisms that assess the *source* of the message (see section 3). Regarding source-evaluation, novices can also be divided in two groups. High source-evaluation competence means that novices are able to discern the quality of the source, while low source-evaluation competence means that the novice misunderstands its quality.

Because in this illustration we are assuming that that the source is competent, reliable, and trustworthy (a benevolent, competent expert), we can also assume that

highly source-evaluation competent novices will discern the quality of the source and thus trust it. Low source-evaluation competent novices, however, will neither acknowledge its quality nor trust it.

In the model, in order to communicate an idea or advice, the expert has to choose between two different kinds of messages:⁹

- *Complex and accurate message.* Complex and accurate messages are understood and considered accurate by novices with high reasoning competence. They are too complex for and not understood by novices with low reasoning competence.
- *Simple and inaccurate message.* Simple and inaccurate messages are considered inaccurate by novices with high reasoning competence. They are understood and not considered inaccurate by novices with low reasoning competence.

The behaviour of novices is guided by their considerations of the content and the source of the message. Novices behave according to the following behavioural rules:

- If the source is trusted, novices accept the message unless it is identified as inaccurate or not understood. In those cases, the message is simply ignored.
- If the source is not trusted, novices ignore the message unless it is identified as inaccurate or not understood. In those cases, the message is rejected.

For novices, accepting a message means that their degree of agreement with the idea or advice communicated is greater after receiving the message. In turn, rejecting a message means that their degree of agreement with the information conveyed is lower

⁹ For the purposes of this model, we assume that complex messages involve elaborate reasoning about causes (for example, mechanistic reasoning), and usually require some background knowledge on basic scientific facts. An analysis of the transmission of a respiratory disease via aerosols, for example, could constitute an instance of a complex message. Simple messages, in turn, just refer to general causal links (without specifying the underlying causal processes) and require no prior background. Unspecific advice regarding mask wearing at all times or washing hands to help prevent a disease can be both seen as examples of simple messages. We also assume that generally, there will be a trade-off between the simplicity of a message and its accuracy. Complex messages usually include qualifications about the conditions under which a causal relationship holds. Nonetheless, those qualifications are usually omitted in simple messages, which tend to be sound unduly deterministic.

than it was before listening the message: the message makes their credence regarding a given issue even lower. When the message is ignored, it is considered to have no effect on the novice and the degree of agreement remains the same.

The effects of the diverse messages on the different kinds of novices are summarised in the following table:

[Table 2]

Complex and accurate messages are accepted and have a positive effect on novices with high reasoning competence and high source-evaluation competence (HR,HS). Those novices, who trust the source, understand the message and do not consider it inaccurate. Nevertheless, those messages are rejected and have a negative effect on novices with low reasoning competence and low source-evaluation competence (LR,LS). Those novices, who do not trust the source, perceive the message as too complex and are unable to understand it. Finally, complex and accurate messages are ignored and have no effect on novices with high reasoning competence and low source-evaluation competence (HR,LS) or low reasoning competence and high source-evaluation competence (LR,HS). (HR,LS) novices, although they understand the message and do not identify it as inaccurate, do not trust the source. (LR,HS) novices, however, although trust the source, are unable to understand the message.

Simple and inaccurate messages are accepted and have a positive effect on (LR,HS) novices. Those novices, who trust the source, understand the messages and do not identify it as inaccurate. The messages, however, are rejected and have a negative effect on (HR,LS) novices. Those novices, who do not trust the source, identify the message as inaccurate. Finally, simple and inaccurate messages are ignored and have no effect on (HR,HS) and (LR,LS) novices. (HR,HS) novices, although trust the source,

identify the message as inaccurate. (LR,LS) novices, although understand the message and do not identify it as inaccurate, do not trust the source.

The (net) effect of each kind of message depends on the ratios of the different types of novices in the target population. The complex and accurate message has a positive effect on (HR,HS) novices, but a negative effect on (LR,LS) novices. The simple and inaccurate message, however, has a positive effect on (LR,HS) novices, but a negative effect on (HC,LS) novices. To illustrate the relation between the effect of the messages and the composition of the target population, let us present some examples of concrete populations.

[Table 3]

[Table 4]

[Table 5]

In population 1 (table 3), where there is a majority of novices with low reasoning competence (and source-evaluation competence is equally distributed), the simple and inaccurate message is the most effective strategy. Nevertheless, in population 2 (table 4), where there is a majority of novices with high reasoning competence, the complex and accurate message is the most effective. Finally, in population 3 (table 5), where novices with high and low reasoning competence are equal in number, both kinds of messages are equally effective.

To identify the most effective strategy, a benevolent expert needs to consider the composition of the target population and the trade-offs involved in each type of messages. According to the model, the complex and accurate message is the most effective strategy if the number of (HR,HS) minus (LR,LS) novices is greater than the number of (LR,HS) minus (HR,LS) novices. On the other hand, the simple and inaccurate message is the most effective strategy when the number of (LR,HS) minus

(HR,LS) novices is greater than the number of (HR,HS) minus (LR,LS) novices. When the number of (HR,HS) minus (LR,LS) novices is equal to the number of (LR,HS) minus (HR,LS) novices, both strategies are equally effective.¹⁰

7. Conclusions

In Goldman's seminal work on expertise, as in many recent philosophical contributions influenced by it, a normative expert-focused approach is adopted. The main aim of this type of approach is to provide criteria that novices should follow to identify true experts and tell them apart from bogus ones. Building on recent empirical evidence from social psychology, we have shown that there are relevant similarities between those criteria of expert evaluation and the mechanisms of message assessment that usually guide novices' behaviour, bringing together findings and insights from different, somewhat disconnected, lines of research. While much of the evidence thus gathered provides some support for Goldman's approach, there is also ample proof of systematic departures from the ideal of open vigilance; but, as we have argued, these divergences are unaccounted by the Goldmanian approach. We therefore have explored the possibility of expanding our focus to cases in which novices can behave in pathological ways. Taking as reference the mechanisms of message assessment, we have identified different kinds of novices by their competence for understanding expert advice and identifying trustworthy experts. We distinguish among competence, content incompetence, source incompetence, and content-and-source incompetence.

¹⁰ This result can also be (equivalently) expressed in terms of reasoning competence. When the number of novices with high reasoning competence—i.e., (HR,HS) plus (HR,LS)—is greater than the number of novices with low reasoning competence—i.e., (LR,HS) plus (LR,LS)—, the complex and accurate message is the most effective strategy. Nonetheless, the simple and inaccurate message is more effective when the number of novices with low reasoning competence is greater than the number of novices with high reasoning competence. When the number of novices with high reasoning competence is equal to the number of novices with low reasoning competence, both strategies are equally effective.

The analysis of the diverse kinds and behaviours of novices provides the basis for a novice-focused approach to the novice-expert relation. This approach, which adopts the standpoint of experts and acknowledges the heterogeneity of novices, allows us to identify important dilemmas faced by experts that nevertheless are opaque to a Goldmanian understanding of the expert-novice relation. We have characterised and discussed a particularly relevant dilemma: the expert/2-message problem. In the context of science communication, experts have to choose a strategy in the issuing of a public campaign to advise or inform certain population of novices. To identify the best strategy, as we illustrate with simple modelling, it is crucial to account for the particularities of the target population. We show how this can often result in expert advice that is simplistic or inaccurate but that is, nevertheless, the option that a benevolent, competent expert would want to choose in order to maximize some notion of social welfare in a given society. This can often mean that there will be a tension between these pragmatic guidelines and some epistemic duties (for example, for accuracy or truth), which experts and public institutions are expected to fulfil. Although in this paper we do not deal with the long-term dynamics of the pragmatic choices that experts may have to make, we can suppose that some of the behaviour that the model describes as maximizing public compliance may have undesired effects on public trust. For example, in the long run, it may end up fuelling further suspicion among sections of the population that are prone to generalized scepticism towards experts.

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Disclosure statement

The authors report there are no competing interest to declare.

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