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# Why Trust Raoult? How Social Indicators inform the Reputations of Experts

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## Abstract

The COVID-19 crisis has highlighted the considerable challenge of sourcing expertise and determining which experts to trust. Dissonant information fostered controversy in public discourse and encouraged an appeal to a wide range of social indicators of trustworthiness in order to decide whom to trust. We analyze public discourse on expertise by examining how social indicators inform the reputation of Dr. Didier Raoult, the French microbiologist who rose to international prominence as an early advocate for using hydroxychloroquine to treat COVID-19. To comprehend how these indicators came to inform his reputation, we outline Dr. Raoult's rise to fame based on discourse about hydroxychloroquine. We then discuss why we trust in experts like scientist-practitioners. This is followed by an examination of how social indicators of trust like status, epistemic authority, influence and values have informed Dr. Raoult's reputation. We conclude with recommendations for how to improve the selection and evaluation social indicators of trust and reputations. Our aim here, instead of making a claim about the efficacy of hydroxychloroquine or Dr. Raoult's reputation per se, is to outline through this case study how social indicators of trust inform reputation and the challenge they present to evaluating expertise.

**Keywords:** social indicators, trust in experts, Didier Raoult, hydroxychloroquine, reputation

## 1. Introduction

The COVID-19 pandemic has been described as an 'infodemic' by the World Health Organization (WHO)[1] due to the misinformation and disinformation circulating from people purporting to be experts. On social media, reliable and questionable sources of information continue to circulate in similar patterns. Both are picked up by professional news outlets (Frenkel, Alba and Zhong 2020; Russonello 2020). This abundance of information has contributed to a sense of information overload[2] which can have unfavourable consequences for managing responses to the pandemic (Mohammed et al. 2021).

Responses to the pandemic have relied heavily on trusting science. This trust is mediated by a rich media landscape which communicates scientific information and whose trustworthiness depends on different reputational patterns. As a consequence of filtering through these communication agents, scientific information can be distorted instead of genuinely simplified by media (Miller 2009). So in a situation of significant uncertainty, where opposite opinions circulate every day among scientists and within the media, where the stakes for public health are so high, whom should we trust? Who are the experts? How are they appointed? And how, in a context of disagreement among experts, do publics reason in order to decide which expert has a more

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[1] Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) causes the **co**rona **vi**rus **d**isease which first emerged in late 20**19** (hence COVID-19). Originating in Wuhan --the largest and most populous city in the Hubei province of central China-- COVID-19 took only three months to spread to 114 countries and become formally recognized as a pandemic by the WHO (World Health Organization 2020b).

[2] 'Information overload' occurs in situations where the amount of information is higher than anyone's information processing capacity, making it more of a hindrance than a help (Bawden and Robinson 2020), especially with respect to healthcare (Khaleel et al. 2020).

reliable reputation? Publics[3] come to trust experts as sources of information because as lay persons --in at least some domains-- they neither have the time nor expertise to verify all the information they encounter. This is a classical topic in social epistemology, better known as the 'expert/novice' problem described by Alvin Goldman (2001) and Elisabeth Anderson (2011). As a solution to the problem, these authors have described a number of epistemic indicators of trustworthiness such as, most notably, academic records, evidence of consistency in the views of the experts across domains[4] and reports on the way experts deal with controversies (epistemic responsibility) (Anderson 2011).

The epistemic indicators Goldman and Anderson provide for discerning which experts are trustworthy depends on a cognitive account of trust. Baier's (1986) will-based account of trust is a triadic relationship, where the trustor (publics) trusts the trustee/trusted (expert) regarding some object, action, task or service (information/recommendation) (p. 236). However Anderson and Goldman's epistemic indicators of trustworthiness do not capture enough of the complexity in a full-fledged trusting relationship, in which many other social and emotional factors play a role, especially when the stakes are high, as in the case of a possible cure for an illness. In other words, trust also has non-epistemic dimensions by virtue of also being described as an expectation, attitude, and emotion (Simon 2010) which is complimented by descriptions of trustworthiness that include moral dimensions (Frost-Arnold 2013; Wilholt 2013).

On this affective account, to trust in others means to accept a reasonable level of vulnerability by exposing ourselves to the possibility (not the certainty) of being betrayed/cheated, or of falling into the hands of individuals whose competence we are in no position to judge. This risk of being betrayed as opposed to merely disappointed has been theorized to be due to a participant stance where deciding to trust is a different attitude than coming to believe (Holton 1994). Both come from the trustor expecting the trustee to have some sort of goodwill towards them in addition to the necessary competence (Baier 1986). The affective dimensions of trust in conjunction with epistemic factors results in an account of trust that is grounded in epistemic and non-epistemic reasons, heuristics and emotional dimensions.

Being vulnerable when we trust does not necessarily mean that we are gullible. Putting ourselves in the hands of someone else in a reasonable way requires us to know how to evaluate their competence and goodwill for the domain in question. When we imagine experts --either as scientists or communicators-- we might expect them to be ethically, socially and intellectually responsible for the advice they give (Thompson 2020), although they might not be. So how do we evaluate competence and goodwill in the case of experts, where the standards of competence are partially opaque for us and goodwill is also difficult to measure given that most of the time we do not know the expert? Publics use epistemic vigilance to check the reliability of the source and the information provided (Sperber et al. 2010). Epistemic vigilance is a continuous low-maintenance monitoring of the risks involved in accepting the testimony of others. We are spontaneously and (sometimes) unconsciously vigilant with respect to general evidence (e.g. past experiences, reputations, domains of competence) and circumstantial evidence (e.g. knowledge of the situation, common interests), but most importantly, epistemic vigilance prevents us from having to trust blindly.

Epistemic vigilance is informed by social indicators of trust. Social indicators are cues in the environment that we use in order to determine who is trustworthy as a consequence of not feasibly being able to verify all our beliefs. Examples include charisma and status. Indicators like these inform one another (e.g. one's charisma can influence their status) and together they form the reputation of an individual. Reputation is the social information that is attached to the evaluation (competence and goodwill) of each individual and is informed by social indicators. Social indicators have dimensions to them, for instance, they can be formally measured or

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[3] We employ a pluralistic description of 'the public' and use the term *publics* to recognize the diverse identities, experiences and expertise that are found in society. This work discusses publics as grouped by nation (e.g. the United States) and pays special attention to local publics, like those in the south of France.

[4] For example, if a certified expert in a certain domain holds totally unreliable positions (e.g. belief in conspiracy theories) in another domain, then we have reasons to lower our threshold of trust in their main area of expertise.

informally quantified. They can also have personal or institutional features that indicate who the trustee is and how they are socially situated. Irrespective of how indicators are characterized, evaluations of expertise are never purely epistemic nor individualistic due to the non-epistemic character and societal context of these cues. In this work we provide a descriptive account of popular social indicators available to publics throughout the COVID pandemic and outline how they help publics to gauge the trustworthiness of experts and their recommendations.

To theorize how social indicators of trust have been used to assess expertise throughout the pandemic, we examine social indicators connected to the reputation of Dr. Didier Raoult (an expert scientist-practitioner) regarding his highly publicized hydroxychloroquine (HCQ) treatment recommendations for COVID-19. Evaluations of Dr. Raoult's reputation are insightful because during the HCQ debate, he was present in traditional and social media, scientific discourse and political circles, suggesting that diverse publics were required to evaluate his expertise. Assessments of his reputation, in large part due to his heightened-exposure on social media (YouTube, Facebook, Twitter), television interviews (The Dr.Oz show, France 2, France 5 and a documentary movie on RMC Story), and newspapers (The New York Times Magazine, Paris Match, Le Monde), caused a mixture of confusion, admiration and contempt among publics.[5] Rather than judge whether Dr. Raoult's recommendation or reputation is trustworthy, our objective is to offer a framework for understanding how social indicators of reputation could have been used by publics in this idiosyncratic case of evaluating expertise. We take this approach because looking before and after the COVID-19 crisis, there will always be experts and an important part of understanding what is considered trustworthy is knowing why publics come to trust the experts that they do.

To investigate how publics could assess Dr. Raoult's reputation and trustworthiness with respect to recommending HCQ, we start by outlining how HCQ became popular during the initial stages of the pandemic (section II). We then consider the role of experts (and scientist-practitioners in particular) with respect to publics' opinions on scientific issues (section III) to set up a discussion of the formal/informal and personal/institutional dimensions of four social indicators of trust that were available for publics to asses Dr. Raoult's reputation as an expert (section IV). Following this, we outline challenges to making good use of reputational cues and conclude with suggestions designed to help publics come to well-informed opinions on scientific issues in general (section V). From this contextual analysis of how publics come to trust experts using social indicators, we propose a classification of those indicators which goes beyond the pure epistemic assessment of the experts and argue that reputations are challenging to assess, often uncertain, and involve many social competences.

## 2. Popularizing Hydroxychloroquine

To understand how social indicators of trustworthiness operated with respect to establishing Dr. Raoult's reputation, we begin by briefly recounting how he came to be known to publics through his HCQ recommendations. In the early stages of the pandemic, HCQ was presented as a viable treatment option in a pre-publication article by Gautret et al (2020). Dr. Raoult, the corresponding author and its most vocal supporter, went on to promote the paper's conclusion, that 'HCQ is efficient in clearing viral nasopharyngeal carriage of SARS-CoV-2 in COVID-19 patients in only three to six days, in most patients' (Gautret et al. 2020, p. 12). For comparison, other researchers were reporting 20-day projections (see Zhou [2020]).

To appreciate the impact of this paper beyond these empirical results, it is important to recall the context in which it was produced. Globally there was serious need for timely and effective solutions to controlling and treating COVID-19. This resulted in papers being heavily circulated before being peer-reviewed[6] and scientists being increasingly asked to weigh-in on the severity of the situation. The interest and uncertainty generated around the paper resulted in one in five

[5] For an example of where scientists share their findings with the media, garner acclaim, and rely on colleagues who have the ability to distinguish genuine accounts from distorted ones, see Miller (2009).

[6] The unique context of the pandemic resulted in a sharp increase in articles on all subjects being submitted to scientific journals and noticeably pre-prints being posted online before peer review (Else 2020).

registered drug trails in the world testing the efficacy of HCQ against COVID-19 for a time (Sayare 2020).

In North America, Dr. Raoult amassed several high-profile supporters which influenced public (and political) interest in HCQ. It started with Dr. Raoult reaching out to the two authors of a publicly available Google document which advocated for chloroquine to treat COVID-19 in order to discuss the Gautret et al. paper in preparation (Rogers 2020). One of the authors recounts that Dr. Raoult sent him a copy of the study and allowed him to post it to Twitter two days before the pre-print release saying "I suspect he gave us permission because he knew it was the fastest way to disseminate the trial results" (Sayare 2020). The other document author appeared on the popular conservative American news channel, Fox News, promoting HCQ as a 'COVID-19 cure'.

HCQ and the Google document would reach even broader audiences when Tesla and SpaceX CEO Elon Musk tweeted 'Maybe worth considering chloroquine for C19' on the evening of March 16th with a link to the Google document. The next day he tweeted 'Hydroxychloroquine probably better' (Wong 2020). Worldwide search data from Google for March 16th to 17th show over a three-fold increase in searches for 'chloroquine' and 'hydroxychloroquine' (see figure 1).[7] On March 19, president Donald Trump would start talking about HCQ. By April 5th the president would claim 'It's a very strong, powerful medicine. But it doesn't kill people,' and that 'We have some very good results and some very good tests. What really do we have to lose?' He would eventually claim to be taking the medication as a preventive treatment in May, shocking reporters, and prompting Google to suppress search results for phrases combining the words 'Trump' and 'hydroxychloroquine' -- potentially out of concern over spreading harmful misinformation (Sollenberger 2020).

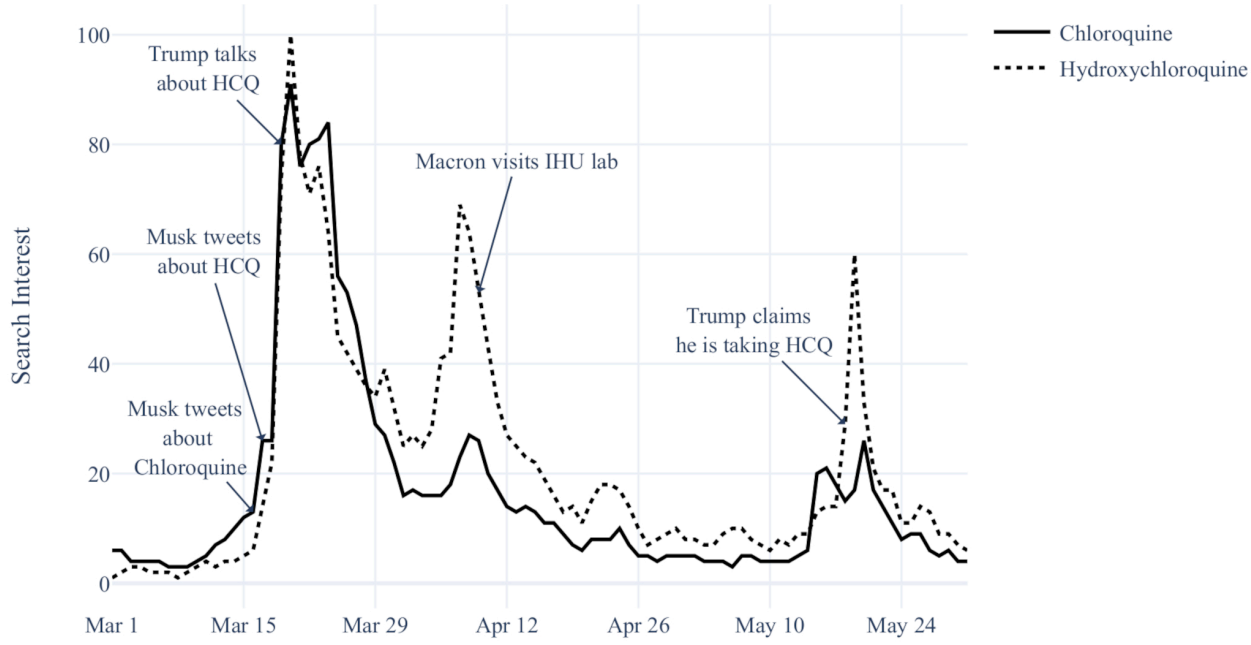


**Figure 1: Global Google search trends for 'chloroquine' and 'hydroxychloroquine'** from March 1st 2020 to May 31st 2020. A value of 100 is the peak popularity for the term. A value of 50 means that the term is half as popular. A score of 0 means there was not enough data for this term.

In France, general publics were initially sympathetic to Dr. Raoult and the use of HCQ. On April 6, 2020, a survey was released by French polling institute IFOP and published in the daily

[7] For additional search results like 'hydroxychloroquine shortage', around the same time see Kim et al. (2020).

newspaper *Le Parisien*, asking citizens about their opinion on the efficacy of the drug. It revealed that '59% of the French population believed HCQ was effective against the new coronavirus' (Corsan 2020). A positive opinion of the drug was more prevalent on the far right and far left and reached 80% among Gilets Jaunes supporters, marking the drug and the rise of Dr. Raoult as a political event (Berlivet and Löwy 2020).[8]

Government responses to Gautret et al.'s paper (and HCQ treatment more broadly) in France were initially mixed. Although having received a visit from President Emmanuel Macron at his laboratory (more on this social indicator in section IV on influence), a biostatistician from the French government's coronavirus advisory committee responsible for reviewing the Gaurtet et al. (2020) paper said that it was 'impossible to interpret the effect described in the paper as being attributable to treatment with hydroxychloroquine' (Sayare 2020). France's health minister, Olivier Véran, clarified that it should only be used under 'serious forms of hospitalization and on the collegial decision of doctors and under strict medical supervision' (Milman 2020), later asking that prescription regulations be revised.

In response, Dr. Raoult stated that the French waited too long to adopt the treatment and announced that he would continue 'in accordance with the Hippocratic oath' to treat patients with HCQ (Sayare 2020). The conviction of Dr. Raoult's research resulted in some version of HCQ treatment being authorized for testing or use in France, Italy, China, India and other countries (Sayare 2020). However, the decision to allow HCQ to treat COVID-19 symptoms (even in select circumstances) resulted in Indian manufactures banning all export of the raw material to protect their own supplies. Reports of shortages for regular prescription holders, doctors self-prescribing to family members,[9] as well as falsified chloroquine products being circulated also occurred (World Health Organization 2020a).

As attention around Gautret et al.'s paper grew, it was increasingly criticized on methodological grounds and with respect to the peer-review process that lead to its acceptance (see Bik [2020]).[10] These criticisms became so substantial that two weeks after the study was published online the publishers of IJAA, the International Society of Antimicrobial Chemotherapy (ISAC), said in a retroactive statement that '...the article does not meet the Society's expected standard...' (International Society of Antimicrobial Chemotherapy 2020) Although this statement may be motivated by external reasons given the attention garnered by the paper, the fact that the statement was made still has an impact on the reputation of those involved.

In response to these criticisms, first author Philippe Gautret acknowledged that 'Usually, we'd take time to write, to make corrections, to consider, to go over other things 50 times' and 'In this case, we were working with a sense of real urgency. Because we thought we had to get the word out, because, maybe, we'd found a way to make things better' (Sayare 2020). Dr. Raoult would eventually temper his claims about the HCQ treatment; subsequent versions of the Gautret et al. (2020) paper downgrade the drug from 'safe and efficient' for use as treatment to only 'safe'. Echoing this precaution, he renamed one of his most popular YouTube videos to 'Coronavirus: a way out of the crisis?' from 'Coronavirus: Game Over'. Dr. Raoult also responded with legal action by opening a complaint alleging harassment and blackmail against Dr. Bik following her methodological criticisms (Davey 2021).

Eventually the scientific community came to the consensus that HCQ should not be used to treat COVID-19 after being found to be ineffective at best (RECOVERY 2020; Rosenberg et al. 2020; Magagnoli et al. 2020; Molina et al. 2020) and harmful at worst (Borba et al. 2020), although establishing this consensus was not without setbacks (see Mehra et al.'s (see Mehra et al.'s (2020) highly publicized Lancet article retraction).

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[8] The 'Gilets Jaunes' movement began in autumn 2019 against green fuel taxes proposed by the French government. The movement rapidly grew to question fiscal policy in reaction to the perceived disconnect between the government and the French middle class.

[9] Reports from Australia describe doctors inappropriately prescribing HCQ to themselves and family members (Davey 2020).

[10] Dr. Bik has also pointed out possible issues in more than 60 other studies by Dr. Raoult (Davey 2021).

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In sum, the Gautret et al. (2020) paper brought publics' attention to HCQ as a treatment for COVID-19 and Dr. Raoult as the spokesperson for it. Despite political concerns and scientific consensus eventually establishing HCQ as an ineffective treatment option for COVID-19, the endorsement of HCQ by prominent public figures like Elon Musk and president Trump influenced publics' perception of Dr. Raoult. In the following section we dissect what social indicators (like endorsements from prominent figures) can do to inform the reputations of experts, especially those in a scientist-practitioner position.

### 3. Trusting Experts: the Scientist-Practitioner

To understand how Dr. Raoult and his reputation might have been perceived, we start by exploring his role as a scientist-practitioner. We use the scientist-practitioner role to frame social indicators of trust like his epistemic authority, influence, status and values. Appreciating his position is crucial to understanding the appeal of his 'intellectual-rogue/ committed-to-care' reputation as an expert. By challenging science from within, with knowledge of how the system really works, Dr. Raoult occupies a privileged position within the scientific community while retaining an appeal to laypublics on the outside (e.g. Gilet Jaunes).

As an infectious disease specialist, Dr. Raoult has made a career as a scientist-practitioner. According to Schafer (2010), the *physician-scientist*, *clinical scientist* or *scientist-practitioner*, 'can be broadly defined as those with M.D. degrees (alone or combined with other advanced degrees) who devote a substantive percent of their professional effort to research anywhere along the entire spectrum of biomedical inquiry, ranging from basic science, through translational and patient-oriented research, to the evaluative sciences.' (p. 1)

The scientist-practitioner is subject to 'the same need for verifiability that greets all scientific enterprises' (Stricker and Trierweiler 1995, p. 37). However in response to 'methodologists' who demand more rigour, Dr. Raoult complains against a 'dictatorship of methodology' in science.[11] In his defense, he contrasts two different kinds of expertise: that of doctors whose main mission is to cure their patients (according to the Hippocratic Oath), and those of scientists whose aim is to meet the abstract standards of research methodology. With respect to randomized control trials which have become the standard in biomedical science, Dr. Raoult says their importance is because of statisticians who have 'never seen a patient.' (Sayare 2020). For comparison, he claims to have developed '10 or so treatments in his lifetime' and never to have done 'anything randomized' (Sayare 2020).

As a scientist-practitioner researching new treatments, Dr. Raoult has experimented extensively with drug repositioning -- a technique he would use to recommend HCQ for COVID-19. Drug repositioning is when medications approved for one disease are repurposed as treatment for another. Beginning in the 1990s he tested the effectiveness of repurposing HCQ on fatal conditions like Q Fever and Whipple's disease, establishing him as an expert in this type of medicinal treatment. HCQ (with doxycycline) is now considered to be standard treatment for both diseases (Sayare 2020). Thus, Dr. Raoult's recommendation to adopt HCQ as a COVID-19 treatment is supported by decades of experience with repositioning this medication.

As a scientist-practitioner, Dr. Raoult emphasizes his commitment to treating patients as opposed to following conventional methodologies. In the following section we explore how publics could reasonably have interpreted different social indicators about Dr. Raoult as a scientist-practitioner which inform his reputation and ultimately, the perceived trustworthiness of his HCQ recommendation.

## 4 Reputational Dimensions of Trustworthiness

The scientist-practitioner role is imbued with socially embedded epistemic and moral dimensions which inform the reputations of experts. Reputation is the social track that all

[11] Andersen (2011) lists responses to critics as an indicator of epistemic authority (more in next section).

our actions leave in the minds of others (Origgi 2019; Giardini and Wittek 2019). It is a cloud of opinions about oneself that can crystallize in judgments and evaluations. Every individual constructs a reputation through the actions that impact the social environment around her. Individuals are also aware of the fact that her actions have an impact, so that she can strategically try to influence others by performing certain actions that 'signal' her competence or goodwill in a certain domain. On the other hand, each of us use these signals to assess the reputation and subsequent trustworthiness of the source and their recommendations.

Dimensions of trust can guide us well sometimes and at other times they lead us to overestimate or underestimate the reputation of people we are asked to trust. When we come up with a trust issue, we are particularly vulnerable to the incompetence or ill will of the trustee. We try to extract from the social environment any possible cue that signals the reputation of the expert in question. Here is where reputation comes as help to orient our trust. Some reputations are more robust than others, based on whether they are informal or formal (Origgi 2019, p. 64). Informal reputations contain all the socio-cognitive phenomena connected to the circulation of opinions: rumours, gossip, innuendo, indiscretions, emotions, informational cascades and so on. Formal reputations include all of the official schemes for putting reputations into an 'objective' format, such as rating and ranking systems, product labels and informational hierarchies established by algorithms on the basis of Internet searches. We can also distinguish between personal and institutional dimensions of reputation. The personal dimensions of reputation are those that attach to the single expert, the institutional ones are those that attach to the institution of knowledge she belongs to. The reputation of an institution influences the reputation of the experts belonging to that institution and, conversely, the reputation of an individual can influence the collective reputation of an institution (Tirole 1996).

To offer an explanation of how publics came to trust in Dr. Raoult, we will proceed by assessing some reputational dimensions through social indicators. Among these dimensions, we consider the reputational features of Dr. Raoult as a scientist-practitioner with respect to: (1) status, (2) epistemic authority, (3) influence and (4) values. Although these dimensions interact with each other, we will explore them separately because each of them uses a different heuristic to asses their impact on overall reputation.

### 4.1 Status

Status is one's position in a hierarchy. Status hierarchies are group evolved adaptations that minimize conflict between individuals over limited resources in a population. Status influences the way in which an expert's opinion will be evaluated by the public. If the expert is in a high position in a hierarchy, people tend to defer to what she says with a favourable bias towards her. Yet status is not only the product of a fixed hierarchy: it is also a dynamic relation that is created in the pragmatics of a verbal exchange. If an expert has a better capacity for argumentation, she can earn status in an exchange and 'force' the interlocutors to defer to her opinion. Status is not only a formal indicator of reputation but can be also an informal one. A great orator can earn status on the spot given her character and dispositions. Status is also judged in relation to others. It is a dyadic 'zero-sum relation', that is, if one speaker earns status in a conversation, the other loses it and this has clear epistemic and moral significance (Lackey 2018). Deference relations attribute status to someone by lowering the status of those who attribute it. Paradoxically those who

make us lose status in a conversation may be those we end up trusting more. Status reveals the importance of the social and relational dimension of trust.

Dr. Raoult is the founder and director of the Institut hospitalo-universitaire M\'editerran\'ee Infection (IHU) in Marseille, France and oversees almost 800 employees. In other words, he has a high status position with the ability to select who he engages with and who has access to him.[12] Unfortunately, the research environment of IHU has been described as 'ancestral' and Dr. Raoult as 'patriarchal' and representative of leadership 'from another era' (Sayare 2020). Outside IHU, Dr. Raoult's reputation in the scientific community (and that of his lab - URMITE) have been heavily criticized. Between 2017-2018, Dr. Raoult's principal laboratory groups were investigated by the High Council for the Evaluation of Research and Higher Education (HCERES) and stripped of their CNRS and INSERM associations (Sayare 2020; Lehmann 2020). In June 2021, it was revealed that the Marseille prosecutor's office opened a preliminary investigation into IHU because of a report by the French Anti-Corruption Agency in 2019 targeting the financial links between the institute and the Development Research Institute (Le Monde avec AFP 2021).

Despite the challenge to his formal status, Dr. Raoult continued to claim a higher status than his opponents (‘I am the elite’, (Le Point 2020)) with an anti-conformist and self-confident attitude in his media appearances. His conduct with colleagues and polemic style against mainstream science arguably created the conditions of a deferential attitude from his interlocutors and the preservation of an informal status, fuelling high traditional media coverage and popularity in social media, growing his reputation.

### 4.2 Epistemic Authority

Status tends to rise in relation to epistemic authority. Epistemic authority is not an easy notion to define because it seems at a first glance paradoxical. How could it ever be rational to surrender our beliefs and defer to others? Can we believe on command? (Zagzebski 2015) Most of the time we do not blindly rely on the epistemic authority of our interlocutors, rather we provide reasons to defend our autonomy of thinking against what we are told. Authority in the political realm as well as in the epistemic one implies using coercion over the will (in the case of politics) or beliefs (in the case of expertise) of others. It is for this reason that authority must be justified. To rely on an epistemic authority A about the belief p means to suspend other reasons to believe p that are independent of reasons that A has to believe p.

It has been argued that trust in epistemic authority is based on a preemptive reason (Raz 1985), that is, a higher order reason that preempts us to search for further evidence in order to justify our trust (Keren 2007, 2019). Epistemic authority engages epistemic trust, or trust gained through knowledge and the validation of experience. Yet, this model of trust in epistemic authority works well in interactive trust, when someone asks us explicitly to trust her. In the case of experts, the trust relation is more distant and we need to base our trust on some kind of evidence of the reliability and honesty of the experts. In the case of scientific experts, we have a system of legitimizations of knowledge that we rationally value as epistemically 'superior' -- that we call science -- that may convince us to rely on their expertise in particular. Among these legitimizations there are the social indicators of the reputation of scientists and scientist-practitioners.

[12] Unlike other senior researchers, he is reputed to make himself accessible to young researchers (Sayare 2020).

Anderson (2011) lists scientometric indicators among cues for trusting experts. Scientometrics --as a formal indicator of epistemic authority-- consists of a number of tools that can measure the 'objective authority' of an expert in a specific domain. Citation indexes, like the H-index, are objective reputational devices that measure the authority of an expert in her field. For citation indexes, the robustness of authority is built into the system of citations that measure the impact of research on other scholars. The more a particular work is cited in other papers by peers in a community of expertise, the more authoritative someone is. Yet, one can argue that these indicators are not so easily available to publics and require some mastery of the scientific practices to actually be informative. Also, the use of scientometrics in the current dynamics of scientific publishing has been criticized at length in terms of its objectivity and fairness. Lastly, a number of biases have been studied that show that the outcome of scientometric measures are not always reliable (Origgi and Ramello 2015).

Laypublics who neither have the epistemic or practical allowances to use scientometrics, often use more informal social indicators to assess the intellectual authority of an expert. A scientist may have a charismatic authority that is determined by her way of speaking, her self-assurance and other personal qualities that justify, in the eyes of others, her epistemic authority. The sociologist Max Weber counts charisma among the types of legitimized authority describing it as 'a certain quality of an individual personality, by virtue of which he is set apart from ordinary men and treated as endowed with supernatural, superhuman, or at least specifically exceptional powers or qualities.' (Weintraub 1948, part III chapter IV) Intellectual charisma can be earned through achievements that impress the public even if they are not backed up by the community of peers. Ability in public speaking, rumours about the exceptional qualities of the “scientific persona” and her extraordinary achievements in a particular domain can boost the authority of an expert beyond the strict circle of her peers.

The reputation of Dr. Raoult is particularly illuminating because he seems to rank high both on formal and informal criteria of assessing epistemic authority. Within his formal domain of research, his scientometric profile presents a very authoritative scientist.[13] He known for aiding in identifying nearly 200 novel species of human-borne bacteria and the first giant virus (Sayare 2020). And in terms of recognition, in 2010 Dr. Raoult received the Grand prix Inserm (Institut national de la santé et de la recherche médicale) for contributions made to science throughout his career (Inserm 2010). These achievements give him a sense of formal epistemic authority which inform his reputation as a scientist-practitioner.

Dr. Raoult also conveys informal indicators of epistemic authority like intellectual charisma using a combination of aesthetics and memorable discourse. Aesthetically his style is that of a 'guru', with long hair, fancy shirts and a silver skull ring on his pinky finger (Sayare 2020). In discourse he compares himself to Clemenceau and Foch --bold French military leaders known for action in times of crisis (Lehmann 2020). His self-assurance is evident in response to doctors who criticize him, denouncing them as 'neither in my field nor up to my weight' (Lehmann 2020). Such bold statements ascribe to him a special charisma that

[13] Some academics have commented that the fact that Dr. Raoult's name is on almost every paper published by members of the institute he directs is suspicious as it is practically impossible to contribute significantly to such a large volume of work (Sayare 2020).

has attracted popular media.[14] He reinforces this avant-garde image through statements like ‘I'm not an ‘outsider’. I'm the one who's farthest out in front.’ (Sayare 2020) While this arrogance obviously had the potential to further antagonise his opponents and block any form of dialogue, it did not diminish his authority in the eyes of certain publics who found in this extravagant character a vehicle for their opinions and feelings towards epistemic and political authorities. In sum, Dr. Raoult's informal social indicators describe the reputation of a charismatic rebel, which in conjunction with formal indicators establishing his expertise, give him a weighty epistemic authority with implications for trustworthiness.

### 4.3 Influence

With increased epistemic authority, Dr. Raoult gains influence and popularity, another dimension along which we can measure the reputation of an expert. Influence measures the popularity of an expert for publics beyond the scientific community. It is the capacity of a message to mobilize the actions of other people (Riquelme and González-Cantergiani 2016). Influence is a different reputational cue than epistemic authority because we infer it from actions of other people towards the message of the expert. Influence also allows individuals to bypass epistemic authority (though as discussed, Dr. Raoult has this as well), especially in cases where 'official' expertise is underrated.

Today popularity and influence are much more quantifiable thanks to social networks. Various easily accessible formal measures of popularity exist such as number of followers, retweets, likes and shares. If I share a post by someone else on Facebook, or I retweet a tweet on Twitter, it means that the original message has had an influence on me. Studies show that popularity tends to influence the beliefs of the users: the more a post or a tweet is popular the more it has chances to become more popular, which means that the users have been influenced by the judgements of previous users (Heinrichs, Lim and Lim 2011; Nahon and Hemsley 2013).

Dr. Raoult's weekly videos on the outbreak often rack up a million views each, far more than the nightly official government press conference and more than 460,000 people have already signed a petition to make his recommendations more widely available (Abboud 2020). Dr. Raoult's popularity only increased as he announced that his hospital would test and treat anyone who cared to show up (Sayare 2020).

A more informal dimension of popularity is the level of admiration from the general public that an expert receives, her media presence and the endorsement of her work by public figures. For example, French President Emmanuel Macron visited Dr. Raoult on April 9th 2020, shortly after his research became globally renowned. Macron's visit to Dr. Raoult resonated throughout the press and although the visit was politically motivated, it had a strong impact on the popularity of the doctor. Afterwards Dr. Raoult was invited as an expert to the ‘Commission d'Enquête sur le COVID' at the Assemblé Nationale in Paris (Moran 2020).

On his popularity and influence Dr. Raoult has said 'I really do think we're in a theatre,' continuing on that 'In my play, the people who judge me as a doctor are my patients. As a scientist, it's my colleagues. And time.’ (Sayare 2020) Though the scientific community

[14] The popular French magazine Paris Match which usually reserves its covers for rock stars and actors, dedicated an April cover to Dr. Raoult (des Déserts and de Violet 2020).

agrees that HCQ is not an effective treatment for COVID-19 (Rosenberg et al. 2020; Magagnoli et al. 2020; Borba et al. 2020), as a social indicator, Dr. Raoult's substantial formal and informal influence augments his reputation as a trustworthy expert.

### 4.4 Values

The way in which we assess the reputations of experts is also constructed by our values. Values are characteristics which can be articulated and appealed to' (Piso et al. 2016, p.216) to guide 'aims, objects, or ends that activity is directed towards' (Brown 2020, p.101-102), ultimately making these objectives 'worthy of pursuit' (Elliott, 2017, p.11).

Values are ubiquitous throughout science and are often categorized as epistemic or non-epistemic. Important works by Fausto-Sterling (1985), Harding (1986; 1991), Longino (1990; 1995), and Rooney (1992) have challenged whether or not this distinction is possible, however it remains a useful heuristic which we will use to talk about the values of scientists and scientist-practitioners.

Epistemic values are intrinsically important for connecting scientific investigations to reality, they are what make science a robust and accurate means for perceiving and predicting features of the world around us. For example, we value reliability in science, or the expectation that repeated experiments will produce consistent results.[15] Non-epistemic values are the personal, social and political values that influence research questions, methods and help to set thresholds of sufficient evidence. According to Miller (2014), values influence evidential reasoning by adjusting evidential weights. This means values influence what counts as evidence, how it is evaluated and inevitably, interpreted. The selection and use values affect our trust in the testimony of others based on perceptions of risk.[16] Hence the acknowledgement of values in science by scientist-practitioners can provide publics with cues to decide how to evaluate the trustworthiness of experts in relation to their own values.

In practice, we have a tendency to defer, often tacitly, to a combination of epistemic and non-epistemic values that we have internalized over the course of a lifetime. For instance, one can agree with how epistemic and non-epistemic values are used in science, recognize it as the best method to pursue truth, and thus reject any expertise without scientific validation. Alternatively, one could hold a more 'populist' vision of knowledge and disagree that the values of science make science more truthful or place scientific knowers in a better epistemic position.

Some values are formal indicators of reputation. Conflict of interest is for example something we can measure objectively in order to assess the reputation of an expert. Replicability is another formal (epistemic) value. If an experiment cannot be replicated the value of reliability is objectively compromised. Other values are informal indicators of the reputation of an expert. The way scientific experts convey values lead us to question them with respect to our common sense ethical views. If the values of an expert are in contrast with the values entrenched in our common sense, this can be a cause of loss, or at least,

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[15] Some historically popular epistemic values — like the 'value-free' form of objectivity — are impossible and undesirable for science. For more, see the normative challenge to the value-free ideal (Douglas 2009).

[16] See Kahan et al.'s (2012) research into worldview and the influence it has on the tendency of individuals to form risk perceptions that agree with their values.

diminishing of trust in the expert. For example, the resistance that was shown by some people against precautionary measures for COVID-19, such as wearing masks, could be read as a suspicion of expert advice that goes against our common sense value of freedom. In general, we trust those experts whose values match ours and are less confident when trusting an expert implies a big revision of our values.

Dr. Raoult's public claims on the efficacy of HCQ offer an opportunity to appreciate the role of values in convincingly transmitting scientific information.[17] First, Dr. Raoult expresses non-epistemic values in his commitment to treating his patients (as per the Hippocratic oath). However, provided the ethical and epistemic criticisms of the reliability of the Gautret et al. (2020) paper, it comes at the compromise of epistemic values. The tension between commitments to epistemic and non-epistemic values is a core challenge of the scientist-practitioner which ultimately influences how publics interpret their trustworthiness.[18] If publics believe experts have goodwill towards them -- such as scientist-practitioners who expresses commitment to non-epistemic values like the Hippocratic oath compared to seemingly abstract epistemic or 'methodological' values-- publics may rationally be more inclined to believe experts that promote non-epistemic values.

The question of how to assess scientist-practitioner values is particularly interesting from a normative epistemological point of view because it is not a disagreement between two different experts' opinions but between two ways of conceiving what science is (and should be) about. On one hand, Dr. Raoult and his collaborators claim that lowering methodological standards can be justified if the treatment can save lives (see Gautret's comments on 'going over things'), thus committing themselves to their non-epistemic values as doctors instead of their epistemic values as researchers. On the other hand, the scientific community claims that it is too risky to rely on results that do not meet the standards required for research to be considered sound.

As a consequence, publics' response to these values is divided. Part of the reason for this is because scientific methods are not common knowledge for laypublics. If you ask laypeople what a random control trial consists of, it is highly probable that most will answer that they do not know what you are talking about. Rather, if you ask them about the aim of scientific research, an obvious answer would be that one of the most important goals is to find results that are beneficial for everybody. Dr. Raoult seems to find results that can potentially treat people with COVID-19 more beneficial than the abstract standards of science which may seem to slow down the process by which HCQ can be made available. As a consequence publics are required to weigh Dr. Raoult's non-epistemic value-based recommendation to take HCQ with respect to their own values. Hence, an appeal to our own values is part of reasoned trust in experts.

### 4.5 Visualising Reputation

Table 1 (below) is a summary of the four social indicators of trustworthiness we have reviewed in relation to the HCQ debate with respect to Dr. Raoult. Note that several examples of social indicators can apply to both persons and institutions in formal and

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[17] Though the consequences of values in science are somewhat discussed with respect to science policy (see Elliott and Resnik 2014), they have been under-explored with respect to science education and communication (Branch-Smith 2019).

[18] For other instances of where publics came to assess the trustworthiness of experts based on their commitment to non-epistemic values, see Epstein's work on AIDS activists who constructed their credibility (Epstein 1995).

informal contexts (e.g. social media). Using indicators of reputation based on personal or institutional features and formal and informal dimensions, it is evident that Dr. Raoult scores highly in all of these. However, these high scores once further examined, are fraught with tension (e.g. his informal reputation with laypublics compared with his formal reputation within the scientific community) which is why making good use of reputational cues can be challenging.

| | **Personal** (e.g. a single person) | **Institutional** (Knowledge Organizations) |
|---|---|---|
| **Informal** (socio-cognitive phenomena) | *Epistemic Authority* e.g. intellectual charisma<br><br>*Influence* e.g. admiration, endorsements<br><br>*Status* e.g. orator skills<br><br>*Values* (epistemic and non-epistemic) e.g. elitism | *Epistemic Authority* e.g. institutional communication, ceremonies, renowned events<br><br>*Influence* e.g. capacity to mobilize people<br><br>*Status* e.g. prestige<br><br>*Values* (epistemic and non-epistemic) e.g. sexist work culture |
| **Formal** (official schema) | *Epistemic Authority* e.g. scientometrics, H-index<br><br>*Influence* e.g. social media<br><br>*Status* e.g. research director<br><br>*Values* (epistemic and non-epistemic) e.g. disinterestedness | *Epistemic Authority* e.g. scientometrics, impact factor<br><br>*Influence* e.g. social media<br><br>*Status* e.g. ranking<br><br>*Values* (epistemic and non-epistemic) e.g. reliability |

**Table 1: Social indicators of reputation** A table that combines social indicators of reputation (status, epistemic authority, influence, and values) along four dimensions: personal, institutional, formal and informal.

## 5. Conclusion

The ability to use reputational cues in a highly sophisticated way does not, of course, require distinguishing each of these dimensions of reputation, or even knowing them at all. Our ability to navigate our social environment relies on an intuitive understanding of these cues, whether it is about assessing social status, epistemic authority, influence or values. Our aim here has been to unpack these different dimensions in order to better understand how an expert's reputation is constructed in the public eye.

On the other hand, this intuitive understanding of an expert's reputation can be supplemented by an evaluation based on more sophisticated reflection. In the case of Dr. Raoult, social indicators represent the challenge of evaluating trustworthy expertise. When all indicators of reputation rank high, can laypublics trust without reservation? In many cases, an exercise in metacognition can be useful for monitoring our own evaluations of indicators and help to make epistemically responsible decisions about whom to trust

(Brennan 2020). Metacognition is the capacity to reflect on our own heuristics of evaluation when it comes to information. This disposition, first coined by John Flavell (1979), is all the more important in the evaluation of scientific information as such information is often not intuitive, and can have high social stakes. The tendency to take a metacognitive stance on our own trusting attitudes is encouraged by the importance of having an accurate representation of reality on a given issue (Morisseau, Branch and Origgi 2021).

An epistemically responsible agent trusts an expert in order to maximize her true beliefs. She thus has a strong motivation to extract all the relevant information she can get from the social environment about the reputation of the expert. If she can only evaluate indirect social indicators, as in the case we are analyzing, she can at least check the coherence of the way she evaluates these indicators. For example, if she values science as an open institution which is committed to the values of transparency, integrity and competence, then she should rank higher the formal institutional indicators of prestige. In this case, personal informal indicators should weigh less. If she is skeptical about the practices of institutional science, then she may trust the authority of a scientist on the basis of her results and declarations, ranking higher personal informal indicators of prestige and charisma. Whatever are her preferences for the reputational dimensions to consider most, an epistemically responsible agent can check the coherence among these social indicators in a particular case by being aware of the reputational cues she weighs as most important.

In the case of Dr. Raoult, he is a recognized expert in his domain but also elicits strong emotions with his charisma, iconoclastic manners and dominant character. He appeals to additional values beyond traditional scientific research and has followers who share his skeptical views about the methodology of science. Yet, there is a tension between his scientific reputation, based on the standard measurement of scientific prestige, and his personal charisma which is earned through an appeal to medical populism, that is, against the very values of science that allow him to rank so highly in terms of institutional objective reputation. His way of boosting his personal prestige and popularity is contrary to the very method of scientific research which he appeals to when he puts forwards his reputation as a scientist. In other words, there is an incoherence between saying 'I am the scientific 'elite' and then criticizing the 'elite' which those who prioritize personal informal indicators should reflect on.

Hence not only do we need to be aware of our own commitments when we weigh the social indicators we use to evaluate a reputation, but we should pay attention to the commitments of the trustee and his or her coherence across these different indicators. In this way, we can compose a coherent picture of the expert and her reputation across these dimensions and develop a reasoned trust. As we have seen, the multiple reputational cues that we may consider must be combined in a sensible way in order to get a reputational picture of the expert in question. This is an exercise in metacognition in which we check the coherence of our reasoning about the reputation of the expert.

Besides coherence, there are other meta-cognitive features of social indicators we can turn to. For example, we can look for consensus among other experts: Is there a general consensus on the HCQ cure and if not, what are the reasons to dissent?[19] We can also

[19] Agreement with consensus alone is not enough of social indicator to signal a trustworthy reputation. Consensus has repeatedly been criticized for representing insular and self-reinforcing conclusions so consensus itself must be examined to see whether it is knowledge-based or otherwise epistemically justified (Miller 2013, 2019).

look for disinterestedness; do scientists have other interests at heart, apart from finding the truth? And what are the risks by standing against the so-called establishment?

In sum, for publics to put their trust in experts, it implies a level of engagement with the reputation of the expert. This engagement is informed by social indicators of trust and the complexity of it is particularly noticeable with experts who rank highly (though perhaps not coherently) across dimensions of social indicators. The visibility of science 'in-the-making' during the COVID-19 crisis has brought the impact of social indicators as reputational cues to the media forefront as publics navigate which experts to trust. Assessments of trustworthiness require a proficiency in interpreting reputational cues and a substantial amount of metacognitive capacity. This capacity can be used to check the coherence of our assessments, and although in most cases we come up with a reasoned trust that weighs cues in a rational way, auxiliary motivations to believe can distort how we evaluate the credibility of experts. In this paper, we have laid out dimensions along which publics reasonably have come to trust or distrust Dr. Raoult. These dimensions include personal and institutionally based social indicators that can be formally and informally understood. As a consequence, trust is never blind: it is a cognitive/motivational attitude that depends on our capacities to read the reputational cues around the expertise we are supposed to evaluate. It solicits our epistemic vigilance and makes us reason around the social information that is available. We conclude that publics have organized and filtered information about HCQ through social indicators of trust as reputational cues in the context of a pandemic -- a transient epistemological environment -- to undergo decision-making which deserves understanding and not admonishment.

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