Why Trust Raoult? How Social Indicators Inform the Reputations of Experts

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Trust, Expertise and the Controversy over Hydroxychloroquine

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Abstract

The COVID-19 outbreak has led to a crisis of communication. A substantial part of the problem has been how social indicators of trust have been employed. As an example, we focus on Dr. Didier Raoult, the French microbiologist who rose to international prominence as an early advocate for using chloroquine and hydroxychloroquine to treat COVID-19. Dr. Raoult's reputation and trustworthiness are challenging to evaluate as he appears to score highly in formal and informal social indicators of being trustworthy, yet the scientific community at large remain skeptical of his recommendations. To understand this disparity, we outline the situation that led to the popularity of Dr. Raoult, revisit key actions and statements that have been used to evaluate his reputation, and outline the challenges of making good use of reputational cues. The focus of this paper is not to make a decisive claim as to whether or not Dr. Raoult's recommendations should be trusted, but rather offer a explanation of how people evaluate information coming from experts, based on the mastery of reputational cues and metacognitive capacities.

1 Introduction

The COVID-19 pandemic has been described as an 'infodemic' due to the misinformation and disinformation that has been circulated John Zarocostas, 'How to fight an infodemic', *The Lancet* 395, no. 10225 (2020): 676. Access to this information is a result of living in an unprecedented information environment Ákos Szegőfi, 'From Jack the Ripper to Jamal the Rapist: Disinformation, Blood Libel and the Imagery of the Immigrant Criminal' (PhD diss., Central European University, 2019). When we consider the sources of this information, we might expect communicators (and scientists) to be ethically, socially and intellectually responsible for the advice they give Sylvia Thompson, *Scientific advisers strive to be 'honest brokers' in times of crisis*, 19 March 2020, `https://www.irishtimes.com/news/science/scientific-advisers-strive-to-be-honest-brokers-in-times-of-crisis-1.4197587`, but this is not always the case. As such, publics are required to exercise epistemic vigilance and

check the reliability of information Dan Sperber et al., 'Epistemic vigilance', *Mind & Language* 25, no. 4 (2010): 359–393. Publics are necessarily active in their assessments of reliability and in addition to evidence, look for social indicators of trustworthiness when evaluating information. In other words, knowledge is made up of more than factual evidence, and involves feelings and emotions which inform epistemic vigilance. Hence, when investigating what publics come to know, we should also ask what makes it easier for them to believe or disbelieve science and experts.

The use of social indicators to assess the trustworthiness of experts with respect to COVID-19 treatments depends largely on the uniqueness of the situation. 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 the name COVID-19). Originating in Wuhan, China (the largest city in the Hubei province and most populous city in central China with 11 million people), COVID-19 took only three months to spread to 114 countries and become formally recognized as a pandemic by the World Health Organization (WHO) World Health Organization, *WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020*, 11 March 2020, `https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020`. This new zoonotic virus has disrupted interpersonal and international relations with respect to economics, transportation, and healthcare. Hence, this seventh coronavirus known to infect humansKristian G Andersen et al., 'The proximal origin of SARS-CoV-2', *Nature Medicine* 26, no. 4 (2020): 450–452 has transformed the physical and psychological well-being of the world.

Due to the urgency and uncertainty surrounding treatment options, publics' ability to develop informed opinions on scientific issues has not been straightforward.[1] To examine this dilemma, we take the case of Dr. Didier Raoult and his highly publicized chloroquine and hydroxychloroquine treatment recommendations to treat COVID-19. We begin by reviewing the discovery and use of chloroquine and hydroxychloroquine (section II). We then look into reasons publics use to make an opinion about such topics, specifically reputational cues that are used to assess the trustworthiness of experts like Dr. Raoult (section III). Lastly, we outline the challenges of making good use of reputational cues, and suggest concrete avenues to help publics develop well-informed opinions on scientific issues in general (section IV).

1. See unsubstantiated information circulating on social media and being picked up by professional news outlets Sheera Frenkel, Davey Alba and Raymond Zhong, *Surge of Virus Misinformation Stumps Facebook and Twitter*, 8 March 2020, `https://www.nytimes.com/2020/03/08/technology/coronavirus-misinformation-social-media.html`; G Russonello, *Afraid of Coronavirus? That Might Say Something About Your Politics*, 13 March 2020, `https://www.nytimes.com/2020/03/13/us/politics/coronavirus-trump-polling.html`.

2 Popularizing Hydroxychloroquine Research

Global interest in HCQ is largely due to an article publishing preliminary results from in-vivo trials in the International Journal of Antimicrobial Agents (IJAA) by Gautret et al. 2020. Following the work of scientists in China (see the in-vitro work of Gao et al. 2020 and Wang et al. 2020) looking into COVID-19 treatments, Gautret et al. 2020 conclude "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." For comparison, other researchers reported 20-day projections (see Zhou 2020), hence Gautret et al.'s treatment would significantly reduce contagion time. However, Gautret et al.'s paper has been criticized on methodological grounds and with respect to the peer-review process that lead to its acceptance (see Molina et al. 2020). These criticisms became so substantial that two weeks after the study was published online, the International Society of Antimicrobial Chemotherapy (ISAC), publishers of IJAA, said in a statement that "...the article does not meet the Society's expected standard, especially relating to the lack of better explanations of the inclusion criteria and the triage of patients to ensure patient safety." International Society of Antimicrobial Chemotherapy, *Official Statement from International Society of Antimicrobial Chemotherapy (ISAC)*, 2020.

In response, first author Philippe Gautret, has said "Usually, we'd take time to write, to make corrections, to consider, to go over other things 50 times" and that "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." *He Was a Science Star. Then He Promoted a Questionable Cure for Covid-19*, 12 May 2020, `https://www.nytimes.com/2020/05/12/magazine/didier-raoult-hydroxychloroquine.html`. Overall, interest and uncertainty from the Gautret et al. 2020 paper has resulted in one in five registered drug trails in the world now testing the efficacy of HCQ against COVID-19 ibid. However, outcomes from other HCQ trials have been almost universally negative: researchers have found hydroxychloroquine to be ineffective at best (see Rosenberg et al. 2020, Magagonli et al. 2020 and the UK's RECOVERY randomized control trial on hydroxychloroquine RECOVERY, *Statement from the Chief Investigators of the Randomised Evaluation of COVid-19 thERapY (RECOVERY) Trial on hydroxychloroquine*, 5 June 2020) and harmful at worst (see Borba et al. 2020).

Official government responses to Gautret et al.'s paper (and HCQ treatment more broadly) have varied dramatically. In France, a biostatistician from the French government's coronavirus advisory committee responsible for reviewing the Gaurtet et al. 2020 paper has said that it was "impossible to interpret the effect described in the paper as being attributable to treatment with hydroxychloroquine" *He Was a Science Star. Then He Promoted a Questionable Cure for Covid-19*. 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" Oliver Milman, *Trump touts hydroxy-*

chloroquine as a cure for Covid-19. Don't believe the hype, 6 April 2020, `https://www.theguardian.com/science/2020/apr/06/coronavirus-cure-fact-check-hydroxychloroquine-trump` and since the Mehra et al. 2020 study (later retracted) asked that regulations on prescribing HCQ be revised.

In response, Dr. Raoult has 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 anyway *He Was a Science Star. Then He Promoted a Questionable Cure for Covid-19.* The French National Academy of Medicine would speak out against the use of chloroquine on May 8th, and even Dr. Raoult would temper his claims about the 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 hesitancy, Dr. Raoult had the name of his infamous YouTube video promoting chloroquine changed from 'Coronavirus: Game Over' to 'Coronavirus: a way out of the crisis?'.

However, while controversy over the Gautret et al. 2020 was in its infancy, the paper would reach new audiences outside of France. First, Dr. Raoult would connect with authors of a Google document (presented to look like a scientific publication) arguing for the use of chloroquine: lawyer Gregory Rigano (also an English language publicist) and investor named James Todaro (an ophthalmologist who does not appear to practice). Rigano would go on to appear on the conservative American news channel Fox News, promoting HCQ as a 'COVID-19 cure', and with permission from Dr. Raoult, share Gautret et al.'s results before publication. HCQ and the Google document would then 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 Rigano and Todaro's document, effectively boosting each of their reputations along with Dr. Raoult's. Musk added the next day, "Hydroxychloroquine probably better". 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). [2]

2. In more detail, the search data also shows an initial peak in searches for chloroquine and HCQ on February 26th, followed a return to minimal levels before a renewed interest in chloroquine starting on March 17 through to March 24th. HCQ overtakes chloroquine as a search term between March 29th and 30th.

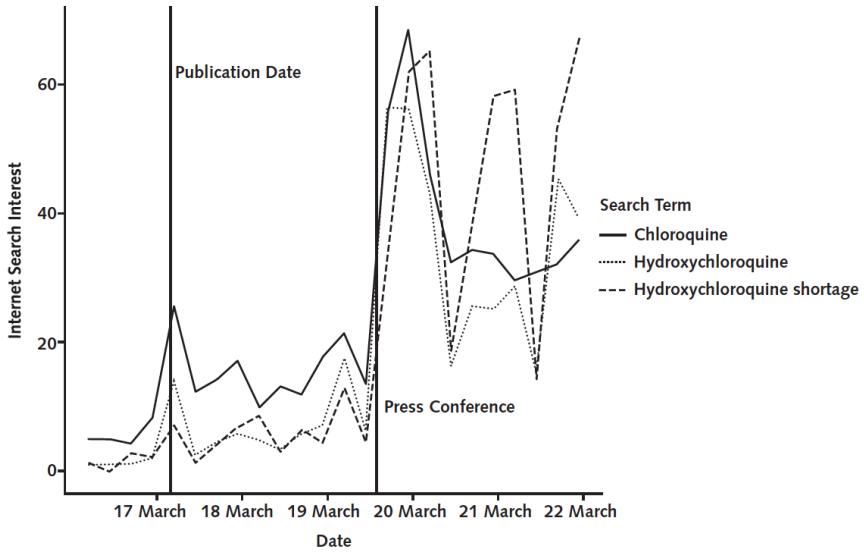

Figure 1: **Global Google Trends search patterns for "hydroxychloroquine", "chloroquine", and "hydroxychloroquine shortage"** from March 16 to March 2020 from Kim et al. 2020. On March 17, Gautret et al. published their report. On March 20th the US president held a press conference describing HCQ as a treatment for the coronavirus.

> A few days later, president Donald Trump would start talking about HCQ (with no mention of azithromycin) on March 19. By April 5th he 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 admit to taking the medication as a preventive treatment in May, shocking reporters, and leading search engine Google to suppress search results for phrases combining the words "Trump" and "hydroxychloroquine" – potentially out of concern over spreading harmful misinformation Roger Sollenberger, *Google may be suppressing "Trump hydroxychloroquine" searches after damning new study*, `https://www.salon.com/2020/05/27/google-may-be-suppressing-trump-hydroxychloroquine-searches-after-damning-new-study/`. Ultimately, the decision to allow HCQ to treat COVID-19 symptoms (even in select circumstances) has resulted in Indian manufactures banning all export of the raw material to protect their own supplies, reports of shortages for regular prescription holders and doctors self-prescribing to family,[3] and falsified chloroquine products cir-

3. Reports out of Australia Melissa Davey, *Australian doctors warned off after prescribing potentially deadly Covid-19 trial drug to themselves*, 25 March 2020, `https://www.theguardian.com/world/2020/mar/25/australian-doctors-warned-off-after-prescribing-potentially-deadly-covid-19-trial-drug-to-themselves` and the United States show doctors inappropriately prescribing it to themselves and family members.

culating in Africa according to the WHO World Health Organization, *Medical Product Alert N4/2020:Falsified chloroquine products circulating in the WHO region of Africa*, 9 April 2020, `https://www.who.int/news-room/detail/09-04-2020-medical-product-alert-n4-2020`.

3 Reasoned Trust: Assessing Reputations

In a situation of high uncertainty such as the case of chloroquine where opposite opinions circulate every day and the stakes for our health are so high, whom should we trust? Who are the experts? How are they appointed? How do we reason in order to distinguish an expert from a charlatan? When we are not competent about the subject matter, as in most cases that involve scientific expertise, we do not blindly trust what we are said, rather, we use heuristics and other social information to come up with a reputational assessment of the expert in question.Elizabeth Anderson, 'Democracy, Public Policy, and Lay Assessments of Scientific Testimony', *Episteme* 8, no. 2 (2011): 144?164, doi:`10.3366/epi.2011.0013` In the following we will present a conceptual framework on the dimensions along which people construct the reputations of experts in situations of uncertainty and apply it to the case of the chloroquine debate.

To trust in others means to accept a reasonable level of vulnerability by exposing ourselves to the possibility (not the certainty) of being betrayed or cheated, or of falling into the hands of individuals whose competence we are in no position to judge Annette Baier, 'Trust and antitrust', *ethics* 96, no. 2 (1986): 231–260

Putting ourselves in the hands of someone else in a reasonable way, however, requires us to know how to evaluate their competence in the domain in question. Trusting in their goodwill does not suffice. Competence and benevolence are the two sides of trust. Evaluating them depends essentially of what we know or think to know about their reputation and the inferences we are able to draw from it.

3.1 The Scientist-Practitioner

Despite the 'goodwill' of Gautret et al. in quickly publishing their findings, the methodological and ethical questions arising from their paper have called into question the competence of its authors. Assessments of competence are largely informed by reputation, and so, we will focus on the reputation of the paper's most vocal advocate, Dr. Raoult.

Dr. Raoult is the award winning[4] founder and director of the Institut hospitalo-universitaire Méditerranée Infection (IHU) in Marseille, France and oversees almost 800 employees. As an infectious disease specialist, Raoult has made a career as a scientist-practitioner. According to Schafer 2010, the 'physician-scientist', 'clinical scientist' or 'scientist-practitioner',

4. In 2010 Raoult received the Grand prix Inserm (Institut national de la santé et de la recherche médicale) for contributions made to science throughout his career *Grand Prix: Didier Raoult – A la Recherche des maladies Emergents*, 2010, in particular his aide in identifying nearly 200 novel species of human-borne bacteria and the first giant virus *He Was a Science Star. Then He Promoted a Questionable Cure for Covid-19*.

"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." Andrew I Schafer, 'The vanishing physician-scientist?', *Translational research: the journal of laboratory and clinical medicine* 155, no. 1 (2010): 1 [5]

As a scientist-practitioner, Dr. Raoult has experimented extensively with drug repositioning. Drug repositioning is when medications approved for one disease are repurposed as treatment for another. For instance, 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.[6] Overall, he claims to have developed "10 or so treatments in his lifetime" and never to have done 'anything randomized' *He Was a Science Star. Then He Promoted a Questionable Cure for Covid-19.* Thus, Dr. Raoult's recommendation to first adopt chloroquine, and then HCQ as COVID-19 treatments, are supported by decades of experience with repositioning medication. However, the scientist-practitioner is subject to "the same need for verifiability that greets all scientific enterprises" George Stricker and Steven J Trierweiler, 'The local clinical scientist: A bridge between science and practice.', *American Psychologist* 50, no. 12 (1995): 995 but the Gautret et al. 2020 paper does not seem to meet this standard. Hence, we should ask whether Dr. Raoult's competence is enough to trust him and what other features define the nature of his trustworthiness.

3.2 What is a reputation that we can trust?

Trustworthiness is argued to have epistemic dimensions (like competence) as well as moral dimensions Karen Frost-Arnold, 'Moral trust & scientific collaboration', *Studies in History and Philosophy of Science Part A* 44, no. 3 (2013): 301–310; Torsten Wilholt, 'Epistemic trust in science', *The British Journal for the Philosophy of Science* 64, no. 2 (2013): 233–253. These dimensions are socially embedded and inform reputation. Reputation is the social track that all our actions leave in the minds of others Gloria Origgi, *Reputation: What it is and why it Matters* (Princeton University Press, 2019) Francesca Giardini and Rafael Wittek, *The Oxford Handbook of Gossip and Reputation* (Oxford University Press, 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. Every individual is 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'

5. The physician-scientist workforce is decreasing. Proposed reasons include high rates of attrition for young investigators and losses due to retirement – the average age of physician-scientists is increasing Richard Gordon, 'The vanishing physician scientist: a critical review and analysis', *Accountability in research* 19, no. 2 (2012): 89–113; Dianna M Milewicz et al., 'Rescuing the physician-scientist workforce: the time for action is now', *The Journal of clinical investigation* 125, no. 10 (2015): 3742–3747.

6. HCQ (with doxycycline) are now considered to be standard treatment for both diseases.

her competence or benevolence in a certain domain. On the other hand, each of us use these signals to assess the reputation of the source.

We can distinguish between informal and formal reputations Origgi, *Reputation: What it is and why it Matters*, p. 64. The first category contains all the socio-cognitive phenomena connected to the circulation of opinions: rumors, gossip, innuendo, indiscretions, values, emotions, informational cascades and so on. The second one includes 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. Adopting an attitude of trust always involves a mixture of rationality, emotions, values, reasons, heuristics and practices we adhere without realizing it. Although they occasionally guide us well, at other times they lead us to overestimate or underestimate the reputation of someone 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. Here is where reputation comes as help to orient our trust. 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.

In order to trust experts, we proceed by assessing various reputational dimensions and then merging them in an overall opinion about her competence and goodwill. Among these dimensions the most relevant to trust a reputation are: (1) epistemic authority, (2) influence/popularity, (3) status and (4) values.

3.3 Epistemic Authority/charisma

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? Linda Trinkaus Zagzebski, *Epistemic authority: A theory of trust, authority, and autonomy in belief* (Oxford University Press, 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 over the 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. A long tradition in political philosophy is geared toward the justification of authority as emerging from an original 'social contract' that give us sufficient reasons to rely on authority. In the case of epistemic authority we do not have an original social contract to appeal to, rather, 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 the expertise of others. Among these legitimizations there are the social indicators of the reputation of a scientist.

Scientometrics consists in a number of tools that can measure the 'objective authority' of an expert in a specific domain. Citation indexes,

H-index that one can easily find on the web (for example using Google Scholar) are objective reputational devices that measure the authority of an expert in her field. In the citation index, the robustness of authority is built through the system of citations, that measure the impact of your research on other scholars. The more your work is cited in other papers by peers of your community of expertise, the more authoritative you are.

When asked to trust an expert, people may use these simple indicators in order to measure the authority of the person in question. Yet, there are other informal social indicators that people use 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 authority. The sociologist Max Weber enumerates charisma among the types of legitimized authority 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."[7] 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, rumors about the exceptional qualities of the person and her extraordinary achievements in a particular domain can boost the authority of an expert outside the strict circle of her peers.

The case of Dr. Raoult is particularly illuminating because he seems to rank high both on formal and informal criteria of assessing epistemic authority. With a H-index of 175 and more than 149000 citations he can be considered as a highly authoritative scientist with respect to infectious diseases. However, the fact that his name is on almost every paper published by members of the institute is suspicious as other academics have commented that it is practically impossible to contribute significantly to such a large volume of work *He Was a Science Star. Then He Promoted a Questionable Cure for Covid-19*. Furthermore, evaluators wrote in reports for HCERES that regrettably, volume as opposed to quality has historically been prioritized. In reality, though Dr. Raoult has published over 2000 papers between 2011 and 2016, only 4% of them were in high impact journals Christian Lehmann, *The Chloroquine Elephant in the Room*, 11 May 2020, `https://forbetterscience.com/2020/05/11/the-chloroquine-elephant-in-the-room-by-christian-lehmann/`.

He is also able to manage informal indicators of epistemic authority. His style is that of a 'guru', with long hair, fancy shirts, a silver skull ring on his pinky finger and internet memes depicting him as a wizard (like Gandalf from Tolkien's Lord of the Rings) *He Was a Science Star. Then He Promoted a Questionable Cure for Covid-19*. Comparing himself to Clemenceau and Foch, bold French military leaders known for action in times of crisis Lehmann, *The Chloroquine Elephant in the Room*, he postures as a scientific pioneer. His self-assurance is evident in response to doctors who criticize him, denouncing them as" neither in my field nor up to my weight". Such bold statements ascribe to him a special

7. Cf. Max Weber, Economy and Society, 1968, part III chapter IV

charisma that has attracted the general media[8]. He reinforces this avant-garde image through statements like "I'm not an 'outsider'. I'm the one who's farthest our on front." *He Was a Science Star. Then He Promoted a Questionable Cure for Covid-19* to the chagrin of his detractors, though it wins him many supporters.

3.4 Influence/Popularity

With more supporters, 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 the general public, beyond the scientific community. It is defined as the capacity of a message to mobilize the actions of other people Fabián Riquelme and Pablo González-Cantergiani, 'Measuring user influence on Twitter: A survey', *Information processing & management* 52, no. 5 (2016): 949–975. Influence is a different reputational cue than epistemic authority because we infer it from actions of other people towards the message of the expert. Today popularity is much more quantifiable, thanks to the social networks. Various easily accessible measures of popularity exist : the number of followers, the number of retweets, likes, 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.

A more informal dimension of popularity is level of admiration from the general public that an expert receives, her media presence and the endorsement of her work by public figures (take as an example the visit of France President Emmanuel Macron to Dr. Raoult on April 9th 2020, a political move that has impacted the popularity of Raoult). Macron's visit to Raoult has had a strong resonance in the press and, although the visit was politically motivated, it made a strong impact on the popularity of the doctor. Influence and popularity can bypass epistemic authority, especially in cases where the values of 'official' scientific expertise are not acknowledged by the general public. More recently (June 24th 2020) Dr. Raoult has been invited as an expert to the "Commission d'Enquête sur le COVID" at the Assemblé Nationale in Paris.[9].

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 chloroquine more widely available.[10] Raoult's popularity only increased as he announced that his hospital would test and treat anyone who cared to show up (crowds gathered in single file, snaking around the entrance way) *He*

8. the French popular magazine Paris Match which usually reserves its covers for rock stars and actors has dedicated its cover to Dr. Raoult on April 26th 2020 https://www.parismatch.com/Services/Sommaire/3699

9. `https://www.liberation.fr/france/2020/06/25/didier-raoult-face-aux-deputes-je-suis-desole-que-vous-n-aimiez 1792349`

10. https://www.ft.com/content/679024aa-d70a-49df-9c77-e4d9967c0f2d

Was a Science Star. Then He Promoted a Questionable Cure for Covid-19. On this 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." *He Was a Science Star. Then He Promoted a Questionable Cure for Covid-19*

His critique of scientists extends to calling them "methodologists". He claims that randomized controlled trials have become the accepted standard in biomedical science because of statisticians who have "never seen a patient."ibid. This 'patient-driven' narrative endears him to publics even in spite of contradicting scientific evidence, on which he has said "I do not know if elsewhere hydroxychloroquine kills, but here it saves lives" M Cei, *Coronavirus à Marseille : Pour Didier Raoult, l'étude qui remet en cause l'hydroxychloroquine est " foireuse"*, 25 May 2020, `https://www.20minutes.fr/sante/2785711-20200525-coronavirus-marseille-didier-raoult-etude-remet-cause-hydroxychloroquine-foireuse`. Hence, Dr. Raoult has defended himself from the attacks of the scientific community by complaining against a 'dictatorship of methodology' in science and contrasting two different kinds of expertise, that of doctors whose main mission according to the Hippocratic Oath, is to cure their patients, and that of scientists whose aim is to meet the abstract standards of research methodology.

3.5 Status

Another dimension of reputation of an expert is her status, that is, her 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 a dyadic 'zero-sum relation', that is, if one speaker earns status in a conversation, the other loses it. Deference relations attribute status to someone by lowering the status of those who attribute it. Paradoxically those who make us loose status in a conversation may be those we end up trust more.

Dr. Raoult's status as director is at the top of a hierarchy. The IHU offers significant scholarships and research grants to students from the developing world. And Raoult himself, unlike other researchers of his esteem is accessible to young researchers *He Was a Science Star. Then He Promoted a Questionable Cure for Covid-19*. However, the research environment of IHU has been described as 'ancestral' and Dr. Raoult as 'patriarchal' representing 1eadership from 'another era' ibid. Outside IHU, Dr. Raoult's reputation in the scientific community (and that of his

lab - URMITE) have been heavily criticized. Between 2017-2018, 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 *He Was a Science Star. Then He Promoted a Questionable Cure for Covid-19*; Lehmann, *The Chloroquine Elephant in the Room.* This loss of formal status has been compensated by recent gains in informal status due to the character of Dr. Raoult. His character as a 'grande gueule' (big mouth) intimidates his interlocutors during interviews, earning him status in conversations. His conduct with colleagues and polemic style against mainstream science earn him status by creating the conditions of a deferential attitude towards him given the uncertainty surrounding COVID-19. In a Youtube video published on June 5th 2020,[11] Dr. Raoult said "I am the élite", revendicating thus a higher status than his opponents.

3.6 Values

The way in which we assess the reputations of experts is also constructed by our values. Values are "something desirable or worthy of pursuit" Kevin Christopher Elliott, *A tapestry of values: an introduction to values in science* (Oxford University Press, 2017), p. 11 that structure our goals, ultimately guiding processes and practices. For science, values are often categorized as epistemic or non-epistemic, though significant works by Fausto-Sterling 1985, Harding 1986; 1991, Longino 1990; 1995, Rooney 1992 and others have shown that we cannot create a discrete list of epistemic values (the descriptive challenge) nor do values fit exclusively into either category (the boundary challenge). And so, what we come to know about values comes from our understanding of how values interact with science. Epistemic values are those which are intrinsically important for connecting scientific investigations to reality. They are what make science a robust and accurate means for perceiving and predicting the world around us. For example, we value reliability in science, or the expectation that repeated experiments will produce accurate results. These sorts of epistemic values strengthen the trustworthiness of science. However, other epistemic values – like the historically popular 'value-free' form of objectivity – are impossible and undesirable in science[12].

Non-epistemic values are the personal, social and political values that influence research questions and methods during the 'context of discovery'. Non-epistemic values are also used to set thresholds of evidence throughout the 'context of justification' and are therefore always present in science. 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

11. https://youtu.be/SjlZplAtuCM

12. See the normative challenge to the value-free idealHeather Douglas, *Science, policy, and the value-free ideal* (University of Pittsburgh Pre, 2009); Elliott, *A tapestry of values: an introduction to values in science*

of knowledge and disagree that the values of science make science more truthful or place scientific knowers in a better epistemic position.

Furthermore, many values are informal indicators of reputation. They impact the institutional dimension of science and guide us in the assessment of the reputation of a scientific institution. Value-based views form part of our common sense. Common sense is best understood as an ineffable feeling of legitimacy whenever we put our trust in a conclusion that has authority in our eyes. Our mental life is populated by countless thoughts and beliefs we are only partly able to justify, but nevertheless structure our common sense which we can question only with immense difficulty. The way scientific experts convey values lead us to question them with respect to our common sense. Other 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. Reliability is another measurable value. If an experiment cannot be replicated the value of reliability is objectively compromised.

Dr. Raoult's public claims on the efficacy of HCQ offer an opportunity to appreciate the role of values in convincingly transmitting scientific information.[13] 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 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. If publics believe experts have their well-being at heart – like scientist-practitioners that reiterate their non-epistemic commitment to the Hippocratic oath – compared to only a commitment to seemingly abstract 'methodological' epistemic values, publics may rationally be more inclined to believe experts that promote non-epistemic values.

This form of disagreement of expertise is particularly interesting from an epistemological point of view, because it is not a disagreement between two different experts' opinions but between two different ways of conceiving what science is about. On one hand, Dr. Raoult and his collaborators claim that lowering methodological standards can be justified if a potential cure 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 a research to be considered as sound.

The response from the public is divided. Scientific criteria are difficult to manage by the general public. If you ask laypeople what a random control trial consist of, it is highly probable that most will answer that they don't know what you are talking about. Rather, if you ask them about the aim of scientific research, an obvious answer would be that

13. 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 Teresa Yolande Branch-Smith, 'Contextualizing Science for Value-Conscious Communication', 2019,

one of the most important aim is to find results that are beneficial for everybody. Dr. Raoult seems to find results – the efficacy of a drug – that can potentially heal thousands of people from the COVID-19, whereas the abstract standards of science may seem to slow down the process by which this drug can be made available. This can lead to confusion about whom to trust. An appeal to our own values is thus necessary to come up with reasoned trust.

3.7 Visualizing Reputation

	Personal (a single person – Dr. Raoult)	**Institutional** (Knowledge Organizations)
Informal (socio-cognitive phenomena)	*Epistemic Authority* (person active) e.g. intellectual charisma *Influence/popularity* (publics active) e.g. admiration, endorsements *Status* e.g. orator skills *Values* (epistemic and non-epistemic) e.g. elitism	*Epistemic Authority* e.g. institutional communication, ceremonies, renowned events *Influence/popularity* e.g. admiration, endorsements *Status* e.g. prestige of the institution *Values* (epistemic and non-epistemic) e.g. sexist work culture
Formal (official schema)	*Epistemic Authority* (person active) e.g. scientometrics, H-index *Influence/popularity* (publics active) e.g. social media *Status* e.g. research director *Values* (epistemic and non-epistemic) e.g. Hippocratic oath, disinterestedness	*Epistemic Authority* e.g. scientometrics, impact factor *Influence/popularity* e.g. social media *Status* e.g. ranking of institution *Values* (epistemic and non-epistemic) e.g. reliability

Table 1: **Indicators of reputation** A diagram that combines various indicators of reputation along four dimensions: personal, institutional, formal and informal.

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We have reviewed the information available on HCQ, and on its famous advocate, Dr. Raoult. With respect to whether or not HCQ is a priori efficient, only a subset of the information that exists is actually accessible to laypeople, even for those of us who are well-informed. One can learn, for example, that HCQ is a cheap and available drug, which has already been used for a long time to treat other pathologies.

Turning to the trustworthiness of the experts we rely on as a source of information, the case of Dr. Raoult has shown how making good use of

reputational cues can be tricky. We will see in the next section that, when forming our opinion based on this body of information concerning both the available facts on HCQ and the trustworthiness of expert sources, weighting reputational cues comes into play, that influences the weight of the arguments on which we form our opinions. In the HCQ case, the message resonates with core values that sometimes outweigh that of assessing reality in the most accurate way.

4 Good use of Reputational Cues

The question of how to distinguish between legitimate and illegitimate sources is a challenging one. When all the indicators of reputation rank high, how should we come up with a reasonable trust? An exercise in meta-cognition can be useful in these cases in order to monitor our own evaluations of these indicators and make an epistemically responsible decision about whom to trust.

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 institutional prestige. In this case, the 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 and then rank higher the 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 is weighting most.

For example, in the case we are analysing, not only Dr. Raoult is an acknowledged expert in his domain, but he also elicits strong emotions with his charisma, his iconoclastic manners and his dominant character. He appeals to alternative values than those of scientific research and has followers who share his skeptical views about the methodology of science. 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 goes against the very method of scientific research which he appeals to when he puts forwards his reputation as a serious scientist. The incoherence between saying "I am the scientific élite" and then criticizing the élite can thus be a reason not to trust his reputation.

Thus, not only we need to be aware of our own commitments when we weight the various social indicators we use to evaluate a reputation,

but also 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 reasonable 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. First, we can look for consensus among other experts: Is there a general consensus on the chloroquine cure and if not, what are the reasons to dissent? We can also look for disinterestedness: Could Didier Raoult have other interests at heart, apart from finding the truth about chloroquine? What are the actual risks he faces by standing against the so-called establishment? Finally, we can pay attention to coarse cues such as prestige and charisma and check them in the light of the general epistemic and non-epistemic values we have towards science.

5 Conclusion

For publics to put their trust in experts is a complex effort. The visibility of science 'in-the-making' during the COVID-19 crisis has brought the impact of reputational cues to the media forefront as publics navigate how to trust in experts. 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, though we intentionally make no claim as to whether or not Dr. Raoult's recommendations regarding COVID-19 treatments are trustworthy, we have laid out dimensions along which publics reasonably have come to trust or distrust him. These dimensions include personal and institutionally based social indicators that can be formally and informally understood. 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 reputational cues in the context of a pandemic – a transient epistemological environment – to undergo decision-making which deserves our empathy and not admonishment.

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