



scientific communication.

Current vaccination campaigns aimed to address vaccine hesitancy do not work or do not work enough.

In the last years, experts and research groups have analysed several strategies of communication about vaccination. In 2014, Brendan Nyhan, researcher at the Department of Government of the Dartmouth College, published on *Pediatrics* a pioneering study [10] to test the effectiveness of messages designed to reduce vaccine misperceptions. Recently, an interesting study [11] highlighting features and differences of vaccination campaigns launched by the Australian government in the early nineteenth century (1803-24) and in the early twenty-first (2016), has been published on *JCOM*. In July 2017, *PLoS One* published two important researches about the effectiveness of debunking on social media [12] and the possible backfire effects [13] in pro-vaccination campaigns.

Issues that were also discussed on *Science Communication* in 2016 [14].

The common trait of all these studies is that they show how pro-vaccine messages do not always work as intended and that vaccination campaigns are ineffective and may often backfire, thus resulting in the unintended opposite effect. In particular, it is evident how debunking campaigns on social media like Facebook and Twitter are not useful as expected, and can strengthen false beliefs, myths and, moreover, the confirmation bias [15] in information consumer. The existence of isolated echo chambers polarizes the discussion, with different groups and 'social tribes' incapable of communicating with each other.

Thus, what is the solution? Does a very effective strategy in vaccine promotion and science communication exist?

The answer is that we should not look for just one final strategy.

Past experiences showed that there are

different approaches in health communication, with different degrees of effectiveness. For instance, the French vaccination campaign ?Immuniser Lyon [16]? or the ?Italian Chart for the Promotion of Vaccinations [17]? represent innovative and effective examples of vaccination promotion campaigns. What they have in common is that they overcome the deficit model [18] of science communication and encourage the adoption of a two-way communication strategy. All the experts agree in the importance of fostering public engagement and a sustained two-way dialogue between science and civil society. It would be necessary [19] to get in touch with parents? fears or beliefs and, ideally, to tailor the communication on such issues to increase the awareness of the need to vaccinate.

The crucial point in health communication is to deal with the increasing mistrust of people towards the institutions and, as suggested by the study of Walter Quattrocchi [12], "a more open and smoother approach, which promotes a culture of humility aiming at demolish walls and barriers between tribes, could represent a first step to contrast misinformation spreading and its persistence online".

Another study [11] also confirms that stakeholders and particularly governments should adopt communication processes that build rapport and trust and recognize that parents' trust in the source of information may be more important than the information itself. Aristotle's modes of rhetoric distinguished between logos (fact-based logical arguments), pathos (emotive arguments) and ethos (argument by asserting expertise). To recognize the role of emotion (pathos) in creating effective communication strategies would be desirable, as feelings and emotions, in the last 200 years, have been downplayed or ignored because of rationalisation and bureaucratisation of our society. Finally, for an effective science communication, it would be indispensable to adopt an approach that combines pathos with logos and ethos, in order to establish empathy between institutions and public.

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This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 612236.

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