

The communication of science as an ethical issue: the case of Raffaele Bendandi

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ABSTRACT

In a ever more connected world, whether justified or not, the possibility that scientific information can be used to produce generalized behaviors by populations results in the need to better understand the processes of science communication. Consequently, it raises serious questions about the ethical message of the communication itself, and the way in which scientists can interface with people with no scientific training. This article analyses the case of the supposed prediction of the well-known geophysicist Raffaele Bendandi and the earthquake of Rome predicted for May 2011 that never happened.

1. Overview about the communication of science

The communication of science often involves professional scientists and generally refers to public media, whereby the aim (of the scientist) is to talk about science with nonscientists. Science communication is important because some information is directly applicable to the 'real' everyday life of populations, such as in the case of the geosciences, which are strongly related to the environment and the territory. These issues can be critical in the face of scientific misinformation, and how much easier it might be to spread false theories and information, with the aim to simply scare populations or to convince the people to do something. Thus, communication of science is becoming of paramount importance also on the political agenda, to inform populations about policies and to obtain the general consensus that might be needed to carry out such policies.

One of the main problems in the communication of science relates to the concept itself of 'science' in the mind of the scientist and in the mind of an average individual. In the former case, 'science' is the amount of knowledge in a certain field of expertise, which is always related to the level of uncertainty: what we know and what we do not know are two indissoluble aspects of science. The expectations of a nonscientist about science, as a member

of the general public, are mostly completely different. In the modern hedonistic world, it is assumed that science can provide certitude, instead of uncertainty. Moreover, science is considered as a way to predict the future.

Obviously, these different interpretations of the crucial word 'science' give rise to two different mentalities, as if they were two different languages. The communication of science is a sensible procedure in which the world seen by the scientist should be transferred to the population, to furnish suitable information so that the population can make responsible decisions. Sometimes the 'cultural mediation' in the different steps of the communication process can introduce misinterpretation, or even contamination of the original message and knowledge. The content is therefore important not only in terms of the knowledge, the certainty and the uncertainty, but also in the way that this knowledge is communicated, as the scientific community has some habits that cannot be considered to be particularly clear and unequivocal to the 'common' people.

As an example reported by the weekly scientific journal *Nature*: "At the end of May 2011, six Italian seismologists and one government official will be tried for the manslaughter of those who died in the earthquake that struck the city of L'Aquila on April 6, 2009. During the hearing, the prosecutor called the committee's risk assessment 'superficial and generic', resulting in 'incomplete, imprecise and contradictory public information'. The prosecutor acknowledged that the committee members had no way of predicting the earthquake, but he accused them of translating their scientific uncertainty into an overlying optimistic message" [Nosengo 2011].

The Earth sciences appear in the proposed framework to be a crucial cross between science and the population, where the communication itself represents a 'policy', and where the knowledge can dispose or propose

a direction in which to go, or ‘what to do’ in the presence of a strong disparity of resources (knowledge and information). Democracy is not only a political methodology dealing with participation, but also an awareness, to be able to freely take informed decisions. Thus, the communication of science, and especially the geosciences, is an issue with a strong ethical content. Furthermore, nowadays, the internet allows easy access to information to a huge proportion of the population. The possibility to choose between ‘true’ and ‘false’ theories becomes statistically equivalent, and the danger we have to face is that the ‘most appealing’ explanation can become the most quoted. We should not be over confident of the self-compelling evidence of science, nor of the general scientific consensus of a theory.

The personal perception of a threat is variable, and it is regulated by many factors, many of which are emotionally driven. In the case of threats to life, behaviors can lead to certainties being dismissed if they are not properly expressed, in favor of potentially spurious, nondocumented, opinions.

This happened recently in Italy, where the population of the city of Rome underwent generalized panic produced by the prediction that Rome was to be hit by a destructive earthquake on May 11, 2011. The forecast was attributed to the studies of Raffaele Bendandi, who had indicated the date in his famous graphs related to his tidal theory of earthquakes. The internet reports that an important Italian consumer organization lodged a complaint with the Rome prosecutors concerning the impact of the alarm, while adding that figures showed that 20% of the working population of Rome, some 600,000 people, had taken that day off. Research showed that along with this 20% who had not gone into work, places outside the city, in the countryside and at the beach, were packed with people.

This episode represents a peculiar ‘case’ in which all the ingredients of societal threat perception and spurious information formed a potentially dangerous recipe in the complete absence of any kind of ‘reasonable’ danger.

2. The ‘case’ of Raffaele Bendandi

Raffaele Bendandi was born in Faenza on October 17, 1893, to a modest family of workers. Their scarce financial resources did not allow him to pursue his education, and so he only completed primary school. He worked in the workshop of a watchmaker and at an engraver’s. The manual experience that he acquired and an innate artistic sense subsequently helped him to make precision instruments and graphs to support his theories (for a complete biography, see Pescerelli Lagorio [2011]).

After the catastrophic earthquake of Messina and Reggio Calabria that occurred on December 28, 1908,



Figure 1. Raffaele Bendandi at the window of his Observatory in Faenza (from the Casa Bendandi archives).

Bendandi was so emotionally affected by the death and devastation that he decided to devote his life to the studies of geophysics, to develop a theory of earthquakes with which he would be able to make forecasts, to protect and save human beings. Over time, he developed his own theories about the nature of earthquakes, which he called ‘seismogenics’. Although unsupported by conventional scientific evidence, he believed that earthquakes are caused by planetary alignment in the solar system: that the moon, the sun, and the other planets have gravitational influences on the movements of the Earth’s crust. In 1931, he published *Un principio fondamentale dell’Universo* (A fundamental principle of the Universe), in which he claimed a relationship between earthquakes and sunspot activity.

Bendandi became famous, not only in Italy, but worldwide, for the huge number of his predictions, which started from the one related to the earthquake of January 13, 1915, that killed 30,000 people in Avezzano, Italy. In the Istituto Culturale ‘La Bendandiana’ (the Bendandi Cultural Institute) archives, it is possible to see how Bendandi’s forecasts were reported by a large numbers of journals and newspapers, such as the ‘Chicago Tribune’, the ‘New York Sun’, ‘La Prensa’, and ‘Le Matin’, over a wide period of time. It must be highlighted that an exhaustive ranking of whether Bendandi’s forecasts were true or false has not yet been performed; thus, the authors refer only to reported claims by

newspapers and not to actual occurrence of earthquakes.

The Bendandi phenomenon ended up by being considered a problem for official science, causing Prof. Agamennone, one of the most considered personalities of that time in the geophysical sciences and Director of the Rocca di Papa Geodynamic Observatory, to include Bendandi in a sort of *damnatio memoriae* list, and as reported by the newspapers, to suggest to Benito Mussolini to officially not trust Bendandi, and to forbid him from making further forecasts.

Bendandi never published a precise account of his forecasting methods, which remain largely unknown today, although he clearly related them to the tidal cycle. This lack of knowledge leaves room for a great deal of speculation and some scientists or 'amateurs' claim to be the depositary of the 'real' methodology developed by Bendandi.

Some of Bendandi's forecasts corresponded to real occurrences of earthquakes, like for the earthquake of May 6, 1976, in Friuli, Italy (one of the last forecasts of Bendandi), and this evidence reinforced the belief in the accuracy of his entire body of predictions. Even if many papers reported a remarkable level of confidence in his forecasts, sometimes using a 'cherry-picking' approach, no attempt was made to prepare a catalog that reported complete validation. The only systematic approach to the Bendandi methodology and forecasting is being carried out by Lagorio and Ballabene, who are preparing some new software called *cruscotto bendandiano* (the Bendandi control panel) that will be able to reproduce the astronomical configurations of importance for tidal effects. This follows the theory of Bendandi's book [1931], and will be compared with the historical archives maintained by La Bendandiana and with the archives of the Istituto Nazionale di Geofisica e Vulcanologia (INGV; National Institute of Geology and Vulcanology).

It is not certain whether the Bendandi archives are complete, for various reasons, amongst which there is their natural dispersion over long periods of time. The archives were also taken over by the municipality only some time after the death of Bendandi, and consequently this does not assure the integrity of the archive itself.

As far as the Bendandi forecasts are concerned, the study of their correspondence is complicated by the fact that the letters are mostly handwritten, which does not render their content instantly intelligible, and which makes their interpretation a relatively difficult job [Pescerelli Lagorio 2009].

Obviously, along with the rumors around Bendandi's death, which happened on November 1, 1979, in his home, these events have contributed to an increase in the cloud of mystery around Bendandi and the findings of his studies.

3. The Rome earthquake of May 2011 that never happened

In January 2011, leaflets with a false claim were distributed around the Ciampino municipality (Rome), which stated that Bendandi had forecast an earthquake on May 11, 2011, and that residents should leave their homes before that day. Rumors continued to spread, in particular through social networking sites, and these specified that the earthquake would affect Rome. In May 2011, it was reported that people were leaving Rome in readiness for the earthquake that was predicted to occur on May 11. The existence of a prediction for that date was denied by La Bendandiana, the custodian of the Bendandi archives, and the INGV held an Open Day at its Rome Institute on that day, May 11, 2011. There was no earthquake in Rome that day. Nevertheless, some media reports drew attention to an earthquake that hit the town of Lorca in Spain on the same day, although it is more than 1,000 km away from Rome. The INGV stated, "There is absolutely no link between Spain and Italy, geologically, or with the prediction of an earthquake in Rome".

The "Corriere della Sera" newspaper splashed Bendandi on its front page, naming him as, "The man who predicts earthquakes". Among the writings Bendandi left after his death, the urban legend attributes some predictions for the future: these were considered so dangerous that someone attempted to burn them, although fragments remain intact and contain two dates: 2011 and 2012. However, the two dates were not accompanied by any geographical locations for the predicted earthquakes.

The strangest thing about the whole of this fear of an earthquake that would strike Rome on May 11, 2011, is that there is no documentation that Bendandi ever made

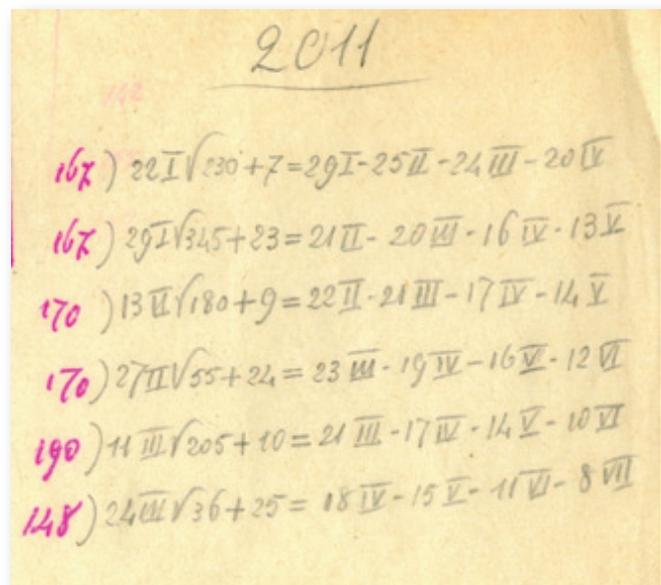


Figure 2. The writings of Raffaele Bendandi that refer to the year 2011 (from the Casa Bendandi archives).

such a prediction. The only thing that supports a supposed prediction of Bendandi for that date was the beautiful alignment of the planets in the sky during that month, with May 10-12, 2011, being of especial note (<http://media.skyandtelescope.com/video/planet-animation-may2011.mov>).

4. Conclusions

After all of this, it is possible to draw some conclusions. First, it is clear that not a single document in the Bendandi archive reports any earthquake in Rome. The communication about the falsity of this supposition was absolutely ineffective, even when given directly to the bulk of the people in the social networks. In addition, as a throwback, some people assumed that the claim was true just because 'official voices' stated that the information about the earthquake was false.

Official scientific Institutions approached the claim by devoting the day to an Open Day, for the population to communicate with real science, and to furnish a clear picture that nothing dangerous was likely to happen. The people participating in this 'open-house' responded positively.

Even reassured by official Institutions, the huge number of people who left Rome represents a parameter that needs to be taken into account should a real potential threat need to be managed, a possibility that could raise again some ethical questions.

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