

The Sentence in the L'Aquila Earthquake Trial

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On April 6, 2009 the Italian town of L'Aquila was hit by a strong magnitude 6.3 earthquake that killed over 300 people, caused over 1600 casualties, and collapsed most buildings in L'Aquila and the neighboring villages.

The earthquake was not totally unexpected, since seismic activity had begun in December 2008 and followed in the next weeks with a number of low magnitude tremors. A few days before the April 2009 earthquake, the Italian National Committee for the Forecast and Prevention of Serious Risks, from now on called the Serious Risk Committee (SRC), composed of several well-known scientists in the fields of Geophysics and Volcanology, met in L'Aquila and declared there was no scientific evidence the seismic activity could end in a major and dangerous earthquake.

In 2011, the court in L'Aquila prosecuted the members of the Risk Committee and in 2012, found them guilty of failing to give adequate warning, and held them responsible for the deaths of people killed in the earthquake. This sentence raised serious concerns, especially within the scientific community, because it was widely believed the defendants were

convicted for failing to predict the earthquake, when it is well known that earthquakes are unpredictable [1]–[3]. This paper is aimed at shedding some light on the almost 1000 pages explaining the motivation of the sentence according to the Italian Law Codes (see the sidebar- *The Italian Law Codes*), and reassuring the scientific community that their members were not prosecuted because of their inability to predict the unpredictable.

L'Aquila Proceeding

As mentioned above, the criminal trial started in September 2011 with the aim of assessing possible responsibility for the deaths of victims of the April 6, 2009 earthquake. The trial ended in October 2012. Seven people were sentenced for manslaughter caused by carelessness, malpractice, and negligence. Those found guilty were the members of the SRC who met in L'Aquila on March 31, 2009, with the official aim *“to provide the inhabitants of L'Aquila region with complete information, as available to the scientific community, on the seismic activity of the preceding weeks.”*

The main charge against the defendants, in their capacity as members of the SRC, was the failure to properly evaluate all elements concerned with the ongoing seismic activity, an evaluation that should have been conducted according to specific state-of-the-art rules and the high competence and qualifications expected of top experts in the field.

In particular, according to the motivation of the sentence cited here in italics, the role played by the defendants inside the SRC demanded them to:

perform the mandatory risk assessment evaluations based on their competences, aimed at predicting natural calamities, preventing damages, and providing clear, correct, and complete information about the expected events.

Despite what was demanded by the law, the defendants provided the population with *incomplete, imprecise information which was ambiguous on the nature, causes, danger and future development of the ongoing seismic activity*, thus contributing, in a

significant way, to the mental processes followed by the population to make their decisions and representing the *main, if not sole, factor* in the decision taken by the victims to stay at home during the night between the 5th and 6th of April, when the earthquake hit L'Aquila.

It is worthwhile noting, for the sake of complete disclosure, that the trial examined only the defendants' behavior during the March 31st meeting and their evaluations and decisions taken during and immediately after that meeting when they made its conclusions public by giving interviews or releasing official announcements. That meeting was aimed at *providing the inhabitants of L'Aquila region with the elements known to the scientific community about the seismic activity*, as reported by the official letter that called the meeting. That official letter included, in the agenda, a careful:

analysis of the scientific as well as civil-defense-related issues about the seismic sequence of the last four months in the region of L'Aquila that attained its peak in the magnitude 4 earthquake of March 30, at 3:38 pm, local time.

Also included in the meeting agenda was the need to *provide an objective evaluation of the ongoing seismic activity aimed at what could be predicted, as well as discuss and provide indications on how to warn the population.*

The above points have to be considered to avoid an incorrect and inaccurate interpretation of the sentence handed down by the court. Indeed, the logical reasoning behind the court's sentence does not refer to a missed prediction of the April 6th earthquake, since the court recognized it was unpredictable and the defendants were not requested to predict an earthquake. Quite differently, the court stated that the expected qualifications of the defendants should have been high enough to avoid generating in the local population full certainty that a new strong earthquake was not expected.

The Duties of the SRC Members

In order to assess whether the defendants had to be considered guilty, the court started from an analysis of the specific duties of the SRC members, including those appointed to the Committee as external experts. In this respect, the SRC's specific task of supporting the National Civil Defense Agency in predicting and preventing calamities has to be taken into account. According to the law (see the sidebar: *The Italian Law Codes*):

Prediction consists of all activities aimed at the analysis and identification of the causes of calamities, identification of the related risks and the geographical areas exposed to these risks. Prevention consists of all activities aimed at avoiding or minimizing damages, also on the basis of knowledge acquired as a result of prediction.

Keeping this task in mind and the consequent duties of all members of the SRC, the importance of the analysis and evaluations performed by the Serious Risk Committee becomes quite clear: they represent the grounds on which the Civil

The Italian Law Codes

To understand how the trial developed and the reported logical reasoning of the court, it might be helpful to remind readers the Italian legal system belongs to the more general system called *civil law*, and is significantly different from the *common law* legal system used in the USA, UK, and most countries whose origins lie in the dissolution of the British Empire.

The *civil law* system can be traced back to the legal system of the Roman Empire and has core principles codified into a referable system serving as the primary source of law. Civil law proceeds from abstractions, formulates general principles, and refers to substantive and procedural rules encompassed into codes. Judges must refer to these rules to render their decisions and have limited authority to interpret law, although precedents can create jurisprudence. In contrast to the common law cases of some other countries, Italian courts can refer to precedents but are not bound by them. In a civil law system, referring to the same codes ensures that similar facts are not treated differently on similar occasions.

In Italy, the decision about guilt of the accused is rendered by the court (and not by a jury, as in the common law system) which may be composed of a single judge or a committee of judges, according to the specific offence on trial before the court.

In the specific case of the L'Aquila trial, the court was composed of a single judge and the rule that received primary consideration was that given by law 225/1992: "On establishing a national service of civil defense," issued on February 24, 1992. This law, at art. 9, defines tasks and composition of the "Commissione Nazionale per la Previsione e Prevenzione dei Grandi Rischi" (National Committee for Predicting and Preventing Serious Risks – in this article referred to as the Serious Risk Committee – SRC). This Committee's task is that of:

providing recommendations required to define analysis and research needs related to civil defense matters, analyzing data provided by institutions and organizations in charge of surveillance of the events considered by this law, evaluating the related risks and required actions, as well as analyzing every other issue related to the activities considered by this law.

The court focused its attention on Article 3 where the tasks of the civil defense service are defined, and which establishes the statutory requirement the SRC was to provide a competent opinion on the two specific tasks of prediction and prevention. In particular, art. 3 clause 2 states:

Prediction consists of all activities aimed at the analysis and identification of the causes of calamities,

identification of the related risks and the geographical areas exposed to these risks.

In clause 3, it states:

Prevention consists of all activities aimed at avoiding or minimizing damages, as a consequence of the events considered in clause 2, also on the basis of knowledge acquired as a result of prediction.

As explained in the text, the court considered the defendants guilty for not having performed the prediction task correctly, as far as it involved the identification of risks.

During the trial in L'Aquila in 2012, the ambiguity of clause 2, which does not explicitly require the prediction of calamities but nevertheless requires prediction of their risk – including the risks of unpredictable calamities such as earthquakes – became evident. In May 2012, the original 1992 law was modified in several parts, including article 3, whose clause 2 has now been changed to read:

Prediction consists of all activities, performed also with the assistance of competent scientific and technical bodies, aimed at identifying the probable risk scenarios and, where possible, alerting, monitoring, watching and real-time surveillance of events and consequent expected level of risk.

This last formulation of clause 2 seems much clearer than the previous one and, had it been in force in 2009, probably would not have provided the basis for a manslaughter conviction. At least, the trial in L'Aquila helped to formulate a clearer law.

Defense Agency bases its decision to cope with calamities such as the L'Aquila earthquake.

The main tasks the SRC was supposed to accomplish correctly were *prediction and prevention of the different possible risks and risk assessment*. Therefore, the court investigated whether those tasks were performed according to what the law established. To do this, it referred to the opinion of highly qualified experts in seismology, its own evaluation of what was stated by the defendants during the March 31st meeting and released to the press, and every other factual element that could be related to the decision of the victims to stay at home during the night between the 5th and 6th of April.

As for the possibility of predicting the earthquake on the basis of scientific data, one of the experts heard during the trial testified that the earthquake which hit L'Aquila at 3:32 am on April 6, 2009 could not be considered an anomalous or exceptional event – neither on the basis of L'Aquila's seismic history nor on the basis of recorded accelerometric data that were in full agreement with the risk map issued by the National Institute of Geophysics and Volcanology (INGV) in 2004. The existing scientific literature and data made available to SRC members at the March 31st meeting would have not allowed

them to predict the April 6th earthquake, but surely would have allowed them to perform a more accurate and competent analysis of events to assess the risk to which the population was exposed. Hence, the purpose of this meeting, that is of *providing an objective evaluation of the ongoing seismic activity aimed at what could be predicted*, was somehow baffled and betrayed by the defendants who failed to comply with the obligations set by the law and the expectations of L'Aquila inhabitants, who knew about the meeting from press releases and expected a qualified and competent opinion on which they could base their actions.

The Charge

Therefore, the court did not prosecute the inability to predict an earthquake (which was explicitly deemed impossible by the court itself according to present scientific knowledge), but the fact that the defendants did not perform the tasks assigned them by the law.

The defense objected that judgment should have been based only on scientific grounds, that is, on the common, agreed-upon scientific knowledge about the possibility of predicting earthquakes. This objection was rejected by the court, which stated that correct interpretation of the law referred specific tasks to the SRC members, and those tasks do not involve earthquake prediction. Indeed, the defendants have not been charged with the missed earthquake prediction, or the missed warning to the population, or even the missed evacuation order, as it could be incorrectly understood by a superficial analysis of the sentence. Nowhere, in the almost 1000 pages of the sentence motivation, is it stated that the analysis of the previous seismic activity could have allowed the expert to predict the April 6th earthquake.

On the contrary, the court refers to more general provisions of the law that impose due caution in undertaking specific duties, such as those assigned to the defendants in their role of SRC members. In particular, in this specific case, the defendants were requested to perform a **strict and accurate risk assessment exercise**.

The court stated:

When expressing a judgment on criminal liability for negligence, confusion should not be done between the scientific inability to predict an earthquake, as a natural event, and the inability to predict the related risk: While it is true, on one hand, that science cannot predict earthquakes, it is also true, on the other hand, that general knowledge and data (the risk indicators that will be considered in the following) made available to the defendants in L'Aquila on March 31st, 2009 allowed one to formulate a pondered evaluation of risk prediction. While, therefore, an earthquake, as a natural event, cannot be avoided, and available knowledge does not allow to issue sound warnings about strong impending earthquakes, the correct risk assessment evaluation (that the defendants did not perform) and correct related information (that the defendants did not provide) would have prevented, or contributed to prevent death and injuring of the individuals listed in the count of indictment or would have decreased their number.

Moreover, according to the court, the defendants' situation was worsened by the fact that they were aware of their position as the **qualified source of information** for the population, who expected the conclusions drawn during the SRC meeting to provide a complete and accurate picture of the situation on which they could base their personal decisions.

In this respect, the court assigned a relevant role to the interviews, given by some of the defendants immediately after the March 31st meeting that sounded extremely reassuring. What was stated by the defendants in these interviews easily could have been interpreted, in the court's opinion, as a minimization, if not exclusion, of the risk of a strong earthquake, thus representing an important element against the defendants.

The court opposed the excessive certainty shown by the defendants that seismic activity was evolving towards a harmless end, as well as the stated **certainty that no seismic risk was to be considered**. The court considered that this certainty clearly conflicted with available scientific knowledge: if earthquakes cannot be predicted, their absence cannot be predicted as well. Therefore, the defendants did not adopt the due caution requested of them under those specific circumstances.

Moreover, independently of the interviews given by some defendants, statements included in the meeting minutes (some of them made public by local politicians, such as the Mayor of L'Aquila and members of the regional parliament) depicted a reassuring scenario for the inhabitants. Indeed, the following entries were found in the minutes (as recalled in the sentence):

- ▶ if no buildings collapsed until March 31st, 2009;
- ▶ if the "potential damages to be expected" in a "future possible scenario" were those on the weakest parts of buildings, but not on the structural parts;
- ▶ if "the seismic events tend to be of the same magnitude" and therefore "it is extremely unlikely that the magnitude increases in the same seismic sequence; and

There were no real and rational reasons to worry. The analysis was reassuring.

The court found the defendant's statements during and after the meeting gave evidence of negligence, thus violating the public law duties assigned to the SRC and contributing to the assessment of criminal liability. However, the court also considered that proving negligence is not sufficient in itself to find the defendants guilty of manslaughter, since a causal nexus has to be proven between behavior of the earthquake victims during the night between April 5th and April 6th, and the defendants' behavior.

Was There a Link Between the Victims' Behavior and the SRC Members' Declarations?

In order to assess whether this cause-effect link between the victims' decisions and the defendant's announcements existed or not, the court assigned ample space, in the motivation of the sentence, to analysis of evidence given during the hearings by relatives and acquaintances of the victims. These relatives and acquaintances were asked about the victims' habits, and,

in particular, how they coped with past earthquakes. Particular attention was paid to possible changes in the victims' way of life (always related to behavior during seismic events) that could have been directly related to or caused by the conclusions of the March 31st meeting.

The motivation of the sentence is very strict in reporting the logical reasoning followed to identify and analyze the aforementioned causal nexus, if any. A causal nexus can be correctly and rightfully stated only if it is grounded in scientific bases, in this specific case represented by anthropological studies supported by probability, which provide the court an accurate and reliable tool to interpret the facts under investigation. It shall be noted, however, the scientific laws and evidence employed cannot lead directly to the sentence, but must be always placed in the context of actual events. Indeed, even if scientific evidence provides a low probability that an event occurred as a consequence of a specific behavior, which would ordinarily suggest the cause-effect relationship is minimal or can be excluded, the investigation of actual events might provide proof of the existence of a causal nexus and, consequently, the criminal liability of the defendants.

In any case, the court has always an alternative way to judge the defendants' liability, since:

*the etiological nexus can be identified, alternatively, either on the basis of a **scientifically-sound law** that represents a "scientific and logical bridge" between behavior and event, or on the basis of **common experience** that represents a "logical bridge" between behavior and event.*

Using the common experience basis to make a rightful assessment of criminal liability, the court proceeded to check the **individual volitive processes** of the victims through evidence given by their relatives in an effort to assess the individual reasons which led each victim to stay home during the night the earthquake occurred.

The logical reasoning followed by the court to assess the defendants' liability for dead and injured people was therefore based on the following points.

1. *The victims' behavior during the seismic events occurring before March 31st, 2009, related to the seismic sequence starting in June 2008, or related to previous seismic events.*
2. *The victims' knowledge of the conclusions drawn during the SRC meeting.*
3. *The victims' behavior after having known the conclusions drawn during the SRC meeting.*

At the end of this investigation, the defendants were excluded from liability for some victims either because a victim's decision to stay at home was based on reasons unrelated to conclusions of the SRC meeting, or because the event that caused their death could not have been avoided even if the defendants had provided more carefully considered information and the victim had taken all possible precautions. An example of the latter case was the collapsed roof of a house inhabited by an elderly lady who was too old to leave her house and stay outside for a long time, especially at night. During previous

earthquakes, it was her custom to sleep near the door, allowing her to leave the house as quickly as possible. It was determined this precautionary measure would have not saved her life, for the sudden collapse of her roof didn't give her enough time to exit the building.

The court concluded the defendants were liable for some, although not all, of the deaths because of their failure to accurately evaluate all risk elements related to the seismic events in L'Aquila in March 2009, and because the committee's underestimation of risk led the victims to believe they were not in danger and consequently, did not adopt the prudent behavior they generally followed in similar circumstances.

Conclusions

In the previous section, I tried to outline the main reasons motivating the manslaughter sentence of the L'Aquila proceedings which so shocked the scientific community. I deliberately did not comment on the verdict, preferring instead to provide readers with the bare facts as they can be understood from almost 1000 pages of the court's motivations for the verdict.

Of course this sentence, as any other sentence, is largely based on the personal interpretation of the facts and the law given by the court. The court in this particular case, according to Italian criminal law, was composed of a single judge. Before considering whether other interpretations were equally possible, let us briefly summarize the court's interpretation. Here are the facts the court considered:

- ▶ Survey of the role played by the defendants when the events considered by the trial took place.
- ▶ Analysis of the tasks assigned to the SRC.
- ▶ Discussion of the prediction and prevention concepts and identification of related activities and goals.
- ▶ Analysis of the March 31st meeting: context, aim, the committee's analysis of events, opinions given by the defendants during the meeting and its conclusions (the meeting's conclusion).
- ▶ April 6th earthquake and its consequences (in terms of victims).
- ▶ Scientific analysis of the seismic risk in the time period considered by the trial.
- ▶ Causal linkages between the earthquake's consequences (always in terms of victims), behavior of the defendants during the meeting (in terms of opinions expressed), and behavior of the defendants after the meeting (in terms of announcements to the press).

The court also considered the role played by the defendants as members of the SRC, their specific scientific competencies and their high qualifications, the law's demand that they proceed with due caution in performing an accurate and in-depth global risk assessment that, in the court's opinion, could and should have been achieved in light of the specific qualifications of each SRC member.

It is therefore concluded the court did not convict the defendants for failing to predict the earthquake (that was recognized as an impossible task on the basis of present scientific knowledge), but for failing to perform a more accurate risk assessment.

Moreover, the court stressed the institutional role covered by the defendants in their capacities as members of the SRC. The court stated that, if the defendants had expressed the same opinions as those expressed during the March 31st meeting outside the SRC context – for instance, at a scientific event – they would have not been considered liable since, as individuals, they were not charged with the same responsibility for the due caution legally required as members of the SRC. Their role inside the SRC assigned them the official responsibility for providing the population with correct information about the ongoing seismic events, a responsibility that was not otherwise assigned them as individuals.

It can be concluded that the intent of this trial was not the prosecution of science and scientists. On the contrary, the trial was aimed at assessing whether the defendants accomplished the tasks assigned them by their institutional role, reaffirming the principle that such a role, assigned in recognition of a high scientific qualification, demands high diligence in accomplishing the assigned tasks with due regard for the very high specific collective value of the involved entities (human lives). The court came to this conclusion also on the basis of the opinions expressed by the SRC members during the March 31st meeting. These opinions did not consider or even contradict previous scientific publications of the same members, and the court found them not worthy of the high reputations of the defendants. Though the logical reasoning appears to be strict, my personal opinion, as well as that of other law experts, is that in this specific context the chain of reasoning is flawed in the court's distinction between earthquake prediction and risk prediction.

While it is true nobody could ask the defendants to predict earthquakes, and it is true the SRC's task was to predict the risks of a calamity, it is also true that if an earthquake and its magnitude cannot be predicted, how can the related risk be predicted?

The defendants probably were too reassuring, considering that Italy is a seismic area and L'Aquila region is one of the most seismically active areas in Italy. On the other hand, the true risk is that presented by buildings (not only old ones, unfortunately!) not constructed according to anti-seismic criteria and standards and which may collapse under earthquakes of relatively low magnitude. Shall we ask a National Committee, such as the SRC, to warn against the risk of improperly constructed single buildings and consider them liable for the victims, or is it better to prosecute all those individuals responsible for single buildings who do not adopt due diligence to conform to seismic standards? In my opinion, the latter alternative is a more effective way to prevent damage such as that suffered by L'Aquila. Since the defendants appealed against this sentence, we will see if my interpretation will be considered more correct than that of the court in L'Aquila.

References

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- [2] A. Chong, "A Risky Business: Professional and public scientific communication after the L'Aquila verdicts," *2013 IEEE*