
The day of the Boston Marathon Bombing

The 15th of April, 2003, was the day of the Boston Marathon Bombing. It was the third Monday of April, also known as Patriots Day in the USA. The marathon is permanently organised for this day and attracts over 500,000 spectators and has an average of 30,000 participants (Boston Athletic Association, 2014). On April the 15th in 2003 two bombs were placed 190 meters apart on 755 Boylston Street, close to the finish line and, also where a large amount of people were located. At approximately 2:50pm these two bombs exploded, roughly 12 seconds apart (Gessen, 2016).

The bombs were made out of pressure cookers filled with nails, ball bearings, screws, various metal fragments and black powder, also known as gun powder (Spencer, 2013). These were then hidden within backpacks that were left on the ground. They were detonated by an electrical charge, which ignited the black powder, rapidly building pressure within the cookers before they exploded, sending fragments and shrapnel outwards from the blast. This type of bomb is considered a low explosive but due to its confined nature, the explosion had a larger impact as more pressure was needed for the pressure cooker to explode.

In perspective, this type of bomb is relatively simple. It is a fairly easy bomb to make as all the materials are very common and therefore no suspicion would be aroused when acquiring them. Also, the individuals making these bombs did not need a lot of knowledge about how the explosion worked. Basic chemistry was all the knowledge needed to build this type of explosive. Recipes for pressure cooker bombs are relatively easy to find on the internet. This means the individuals involved do not need to have any experience with bomb making or even chemistry.

The explosion caused insignificant damage in relation to structures, this included shattered glass and minor damage to the buildings in close proximity (Ross, 2016; Conner and Black, 2013). This indicates that this bomb was a low explosive, as the buildings were fairly close to the explosion. From the bomb placement (on the sides of the road closer to the front barriers) it was clear the buildings and structures were not the intended targets. These two bombs killed 3 people and injured 264. Out of those 264, 16 people lost limbs as a result of the attack (WCVB, 2015).

These individuals knew there would be a large amount of people present at the marathon, especially at the finish line. This suggests their aim was to injure and/or kill as many people as possible. There was speculation they wanted to also use these types of IED's (Improvised explosive device) at other largely populated places like Times Square in New York or the Boston's Fourth of July celebrations (McLaughlin, 2013; Peltz and Hays, 2013). This firmly suggests their motivation was to injure or kill as many people as possible and the Marathon was only chosen as it contained the crowds and a heavily populated area they wanted.

As the marathon was on a commercial street there were many security cameras that could potentially have taped how the bomb got into position, the individual who placed the bomb, what the bomb was concealed in and other information such as this. As well as store owned cameras, people were continually taking pictures and videotaping throughout the day. When the FBI launched their investigation one of their first steps was collecting and watching all

surveillance footage from the sites of the blasts before they occurred, to try and determine what happened. But, it was a photo from the public that 'broke the case' and pinpointed both the bag that held the bomb, as well as the person who placed it there (Greenfield, 2013). Through this type of surveillance a 'man in a white hat' was spotted. Once they had this information they used all the surveillance gathered to follow this 'man in the white hat' through the crowds.

Through this type of surveillance, officers determined there were two perpetrators directly involved. They also had footage and photos of the two individuals that were clear enough to identify them both. These photos were released to the public to find their identity. As well as finding the individuals involved, the videos showed the white smoke created from the explosion (Ackerman, 2013). This was important as it provided insight into what type of explosive was used. As military grade explosives (like C4) create a black smoke, the white smoke observed from this explosion indicated that it was an improvised explosive device.

As soon as the area was cleared of people and was considered safe, 30 highly trained forensic experts were combing the scene for remains of the explosives and any evidence that could shed light onto the device used (Taylor, 2013). Forensic evidence that was found included scraps of black nylon, shards of metals, and even the complete lid of a pressure cooker (BBC, 2018). Evidence like this was a huge find, as it potentially could have had trace evidence such as fingerprints, and explosive residue. The remains on nylon suggested that the bomb was contained within a material bag. The evidence produced was useful because it made it easier for police to identify what contained the explosive material, how the explosive built pressure and also how the bomb was placed in this heavily populated area without arousing suspicion.

From a forensic point of view, evidence was imbedded in the individuals injured from the explosion. The shrapnel that exploded from the bomb is a very important aspect of an explosion and much of the shrapnel that was a part of both explosions were not contained in the crime scene (Gates et al., 2014). The individuals injured by these projectiles were taken to hospitals, and took the shrapnel with them. This created an issue as it highlighted a limitation within forensic protocol. It is important to collect evidence, and also keep the integrity of the evidence. In this case, no protocols were in place and all the pathology departments were left with unclear guidelines and uncertainties when examining and handling evidence from patients and amputated limbs (Brunner, et. al., 2015). This bombing did highlight a lacking protocol within the forensic process and since then, protocols with clear guidelines across the country have been implemented to handle these trauma-related specimens, to keep the integrity of the evidence (Gates, et.al., 2014).

The Boston Marathon bombing did highlight some modern day investigation and forensic insight. Alongside the official investigation led by the FBI, a comparable unsanctioned investigation was being conducted, online. A group that harnessed the power of collective knowledge and resources worked toward the common goal of helping the investigation in any way they could. This type of cyber-sleuthing is not new, it has been used successfully in cases before (Shaw, 2014). In the case of the Boston Bombing, many professionals pooled together their skills and expertise within these forums. This type of online crowd sourcing could potentially be very useful. An individual with a military forensic education gave comprehensive information on the explosion (Nhan, Huey & Broll, 2015). Another, identified the hat worn by the suspect (Tapia, et al., 2014), as he owned the same hat, and another identified the triggering mechanism used in the bomb as he was an avid RC modeller and recognised a 'chip' from the photos released of the scene. The sheer amount of people reading and observing all the

evidence provided means objects could be identified a lot faster, many different angles could be analysed a lot earlier and many different experts can analyse and form their own opinions of evidence. Though, this type of unauthorised investigation can lead to false allegations and dangerous hearsay (Simpson 2013). In fact, this type of online investigation led to the FBI releasing the photos of the perpetrators, as an online forum site known as 'Reddit' wrongly accused an innocent bystander of being the Boston marathon bomber (Potts and Harrison, 2013). To limit the negative impacts of this type of online sleuthing, police management should be heavily involved. Experts such as cyber analysts, could monitor forums, removing information that they know from their official investigation is wrong and using posts that potentially have useful evidence to further their official investigation. As the internet continues to grow this type of sleuthing is becoming more and more prominent within investigations. It is going to occur whether the officials want it to or not, so officials should try and benefit from these forums as much as possible and limit the damaging impact that can potentially have.

After an intensive manhunt the two males were identified and found. Two brothers, Dzhokhar Tsarnaev, who at the time was 19 years old and his older brother Tamerlan Tsarnaev who was 26 years old. Tamerlan, when confronted, died during a shootout with law enforcement (Fuchs, 2013). Dzhokhar was injured in the same shootout and eventually was charged for the bombing.

There was no specific motivation behind these individuals choosing the Boston Marathon as their target. It was chosen as it had a high number of people attending not because of the marathon itself. It was a highly populated area that had limited security and lacked bag checks and metal detectors. The suspects were thought to have been terrorists in connection with the Islamic state (Greenwald, 2013) but soon it was realised they had no connection to any terror groups (Dalgleish, 2015). Although their method for making the pressure cooker bomb was from an Al Qaeda's magazine they had no connection to any well known terrorism groups and no terror groups took recognition for this act. The eldest brother, Tamerlan, had gone to Dagestan in Russia and it was believed that he was radicalized by a group called The Union of the Just ("The Brothers' Examines Motivation Behind Boston Marathon Bombing", 2015), but again, no terror group took recognition, so there is no certainty if they sanctioned this bombing. From a note written by Dzhokhar, it is suggested that their motivation was retribution for the US's role within the Afghanistan and Iraq war (Katersky and McPhee, 2015).

The Boston Marathon Bombing was one of the most prominent bombings within US history. It highlighted the fact that bombs could be made by novices and recipes were readily available online. The investigation stimulated forums into action and developed an unofficial inquiry where cyber-sleuths established themselves, both helping and hindering the official investigation at different points in time. The forensic team that analysed the scene, proved that forensics is an integral part of these types of incidents, by collecting and analysing vital pieces of evidence that were successful in the case against Dzhokhar. Though, limitations were highlighted by the lack of protocol for the shrapnel (evidence) within victims. This has pushed more forensic protocols within hospitals across the US. The Boston Bombing proved how successful and fast-paced a FBI investigation can be and how online communities can work together to compliment this investigation