# Debate: Scientific representation

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**Side A**: Trust the picture: the decision not to drop the bomb was made based on a picture produced by significant technological and scientific expertise, and is therefore trustworthy.

In the movie, 'Andromeda Strain', the scientists, towards the end, observe that the pathogen actually "functions like an atomic reactor!" (1:35:04-1:35:11), and that dropping the bomb will actually accelerate the growth and spread of the alien pathogen, which could inevitability harm us and put is in a worse situation. The scientists seem to be very confident in their observations as they make claims such as "Andromeda is perfect for existence in outer space. Consumes everything. Wastes nothing" (Andromeda, 1:34:37-1:35:00), and "an atomic blast could provide it with enough energy to grow into a gigantic super colony" (Andromeda, 1:35:04-1:35:11). As an observer relying on results from a very limited number of experts, confident and validated statements are usually trustworthy - especially when you need to process results quickly.

In addition, it should be established that the picture in this case, is actually a video and actions that are unfold are occurring in real time. The scientists are able to observe the mutations and increase in size and the microscope is just a tool that allows them to see the mutations closely, but do not change the pathogen itself.

We have to believe in technology, scientific representation and our prior knowledge in order for us to make a decision. Since this object is unknown and foreign, the only tools we have are the ones we know and have validated in the past. We have to trust the incubator machine as it is the only piece of technology that produces diagrams or some form of representation that allows us to make decisions. Lane, in 'Geographies of Mars', writes about Schiaparelli's drawing of Mars using the telescope, and the fact that his failure to

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utilize the telescope in drawing some parts of the map led him to draw an incorrect map. This can be applied to this scenario as not putting faith in the machine might lead us to having incorrect results. Furthermore, we generate and trust many reports that come from technology - such as the technology to monitor for nuclear activity, weather, natural disasters and much more. Technology builds on the reliability of the underlying technology, and in this case, because the machine was built with reliable and scientifically proven materials, it should give us valid results.

Likewise, Dumit, in his book 'Picturing Personhood', writes about trusting technology in different applications such as PET scans. Dumit writes, "New Seeing-Eye Machines ... look inside your body, can save your life" (161), and "medical imaging promised to provide early warnings of the onset of mental illness, one of the largest problems in its treatment and prevention" (147). This helps reinforce the idea that we have to believe in technology even if it becomes very difficult to validate the results of our experiments and hypotheses. Also, we are able to use scientific knowledge and our observations to make technologies that are able to give us accurate predictions about medical problems we problems we think of or like brain tumours. If this is true, then we should be able to do the same with items unknown to us, in the same way as the operation of the brain was once unknown to us.

In addition, there is very little reason to believe that there would be data alternations or intent to wrongfully explain the data since it is a problem that would impact both the people and the scientists. The aim is not to publish research or convince people to use your product, but to save lives of individuals and potentially their own. The aim of sharing or using scientific representations is very important, and in this case the aim helps reduce doubt on their results. Furthermore, the fact that this was their second opinion also helps since they were able to learn from doing research for their first opinion and then improve on it. This potentially means that they were able to reevaluate the results and make a better decision.

**Side B**: Drop the bomb: a scientific and technological picture is not sufficient grounds for making a decision of this magnitude.

An initial reason to doubt the reliability of their progress is the fact that they are indecisive, and they have changed their decision twice. They did not have certainty in their own hypothesis, which led them to explore different options. This reduces the reliability because it implies that they might still not be sure if they are correct or not, and the technology or representation they have used was not successful in giving them a correct conclusion initially. This could imply many different faults in the technology and the representation, and without exploring these faults they might not be able to fully validate their results. It is the first time that they have observed a pattern, or an alien pathogen like this, and therefore their judgement based on their initial observation on the structure cannot be trusted. Myers, in his paper 'Illustrations in sociobiology', writes "it is not till the same phenomena repeat themselves in the same, in the same place, a great number of times, that the observer learns to trust these impressions" (Myers, 50). The technology and the knowledge of the scientists is very limited for this scenario, and they do not have the theoretical framework to make a claim to not drop the bomb that could potentially kill millions of people. It is the first time that any of them have seen a pattern as such.

In the scene they observed the pattern once, and make a decisive conclusion based on their one observation. They did not repeat the experiment to validate whether they would see the same kind of multiplication from the alien pathogen or if it always proved the same pattern. Tucker writes, "a photographer must 'prove his photograph' by expounding the manner in which it had been made before the image could be admitted as a matter of fact" (Tucker, 379). The photograph in this case is the moment where the duplication occurs. Proof in scientific representation is important, and it is vital to have more data and more observations in order to prove this. They have not repeatedly observed this pattern "a great number of times'.

Moreover, they are attempting to use scientific representation and techniques they know to study and observe patterns on items that might not follow the same patterns. Since this is an alien pathogen we can

not conclude and make decisions solely based on the technology we have. Tucker writes, "like photographic practices in meteorology and bacteriology, spirit photography highlighted issues of witnessing, detecting, and deceiving" (Tucker, 402). Similar to spirit photography, this meteorite comes from an area we have not explored in the past or have significant experience in, and the contents of the meteorite are also unknown to us. Utilizing our instruments to help witness and detect what is in that material might not work, and becomes problematic if we trust it completely. The technology was created, tested, and validated to items found on Earth. In the scene they have not validated the use of their technology on these foreign objects. They also can not be completely sure since they have very limited ways of validating their technology against unknown objects.

The data that was presented and observed for not dropping the bomb did not follow the correct 'graphical integrity' values that Tufte proposed in his book 'Visual Display'. Without following these proper practices to treat and understand data it seems like the observation could have been rushed or made without complete considerations of what the data could represent. Here we are treating the picture as the evidence rather than the conversation. Being engaged in the conversation does not allow us to doubt the image as it biases us towards the material in the conversation. The role of the graphic is to be objective. It is hard to focus and understand what is happening in this piece of evidence as there are no "clear, detailed, and thorough [labels]" (Tufte, 77), and it is missing clear "explanations of the data on the graphic itself [and labels on] important events in the data" (Tufte, 77). As an outside observer this makes it hard to validate whether or not the scientific accuracies of using this evidence are correct or not. To be cautious, without graphical integrity it is not reliable to trust the data.

For the sake of argument we will not drop the bomb, and run more tests to validate if our understanding and the conclusion we made are accurate. Dropping the bomb could potentially speed up the process, and cause many more deaths. It is more reliable to play it safe, and validate the new hypothesis in more detail.

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