An Analysis of Social Factors in High-Stress Situations

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction

In the world today, the decisions of people are highly influenced by the work of some algorithm. Someone, somewhere has designed a process that takes existing information and calculates Whether it be in health, finance, or even something as trivial as video games, the use of algorithms has become tightly integrated in our lives. Most people don't think twice about trusting the end results and go along with the suggestions of such algorithms. They are the result of logical operations on real data. There is good reason to trust in them, but how far are people willing to trust them? Especially when they are used within dangerous circumstances and lives could be at stake. When does instinct begin to seem more trustworthy than an algorithm? This paper will attempt to answer this question by looking at the psychological, ethical, and general social aspects of this question. How do things like mob mentality and being placed in life or death situations affect their ability to trust in an algorithm? How would ethical and philosophical principles also impact their decisions? In other words, to what extent do social factors impact people's trust in algorithms. This thesis argues that whether or not people trust the algorithm is dependent on their familiarity with their surrounding environment, the people, and the system. It does this by investigating human behavior during mass panic, predicting ethical response, and looking at the stakeholders involved.

Terms

Some of the terms that will used will be as follows. First, the psychological components, or more precisely the social psychological components, should be examined. Something that could be closely related to this question, is mob mentality. Also referred to as herd mentality, it is the phenomenon that occurs when an individual within a crowd loses their sense of self and individuality in a process called deindividualization (Donley, 2011). The individual loses all

sense of personal responsibility of their own actions but becomes an unspecified member of the group that may perform certain actions (Mahalleh, 2017). One of the major reasons is due to the fact that people lose this personal responsibility as they can blame or attribute said action to the group, absolving themselves of the actions committed (Donley, 2011). This introduces the idea that people may behave differently when put together in a group. Also, for the purposes of this paper, panic will be the defined as the following: "…inappropriate (or excessive) fear and/or flight and highly intense fear and/or flight." (Mawson, 2017).

For the ethical/philosophical components, it's important to define to the terms, utilitarianism and egoism. "Utilitarianism is a particular type of consequentialism in which the outcomes of an action or position are calculated in a structured way in order to arrive at an answer on whether something is ethically acceptable. The word 'utility' was defined by Jeremy Bentham, the idea's first proponent, as "the sum of all pleasure that results from an action, minus the suffering of anyone involved in the action."(Driver, 2014). In laymen's terms, essentially it is an ethical principle that seeks to maximize happiness. It is commonly associated with doing the most good for the most amount of people. In other words, for the good of the group. On the other hand, Egoism "… is an ethical belief that we should behave only according to what suits our own self-interest." ("Key ethics ideas", n.d). It is ethical self-preservation. While it is not the complete polar opposite of Utilitarianism, (that would be Deontology) differences between the maximizing of happiness in a society versus maximizing benefits for the individual can be clearly seen.

Research

One of the first things that was investigated was the psychology of people during high stress situations where panic seems like a likely response. In a 2016 study conducted in Nanjing,

China, a questionnaire was used to determine the likely responses someone might have during situations where an emergency evacuation in a subway is necessary (Wang et. al, 2016). The questionnaire was split into two parts. The first section dealt with basic personal characteristics while the second part asked about questions that concerned evacuation psychological behaviors. The answers of this questionnaire were then used to help determine the factors that might contribute to panic psychology. From 151 received questionnaires, 141 were considered valid. What was found was that about 90% of the people had never experienced any sort of emergency and only about 20% of the people would be able to stay calm during the situation. Something interesting that was found was that most people would try to go out on their own and explore the situation at hand if it was their first time experiencing such an event (Wang et. al, 2016). It was also found that people were more likely to trust the subway staff and follow exits signs if they themselves were familiar with that station. If they were not however, they were much less likely to follow the exit signs, yet still placed their trust in the staff members. Interestingly, the number of people that sought to follow the direction with a lot of people were comparable with the amount of people that followed the exit signs.

From this paper, some things are made pretty clear. While people aren't going to calmly go about evacuation proceedings, they don't just immediately burst into a panic state. Rather than that, based on their familiarity with their surroundings, their behavior can be noticeably different. Those that are familiar with the environment will trust both non-human entities that tell them where to go and they will follow the directions of the staff workers. They place their trust in them because they have developed a relationship between them and through daily use have found them to be worthy of trust. For the people who aren't familiar however, do not place their trust in the sign, but do for the workers. Could it be that they do so because the subway workers

have a sense of authority and should know what they're doing? Nonetheless, the data seems to show that people look for other people with more knowledge about the situation, rather than following the environment's path. This also seems to suggest that people aren't immediately going to devolve into rampant mob mentality.

There is other evidence to suggest this as well. One journal article discusses how likely people will actually begin to panic and size of the group that does succumb to panic. It mentions that it is actually uncommon for mass panic to occur during disasters, combat, structural fires, etc. On the contrary, mutual aid tend to override self-preservation. A notable example being the September 11 Attacks (Mawson, 2017). It attempts to explain this presumed panic and flight response. When do people choose to flee a situation?

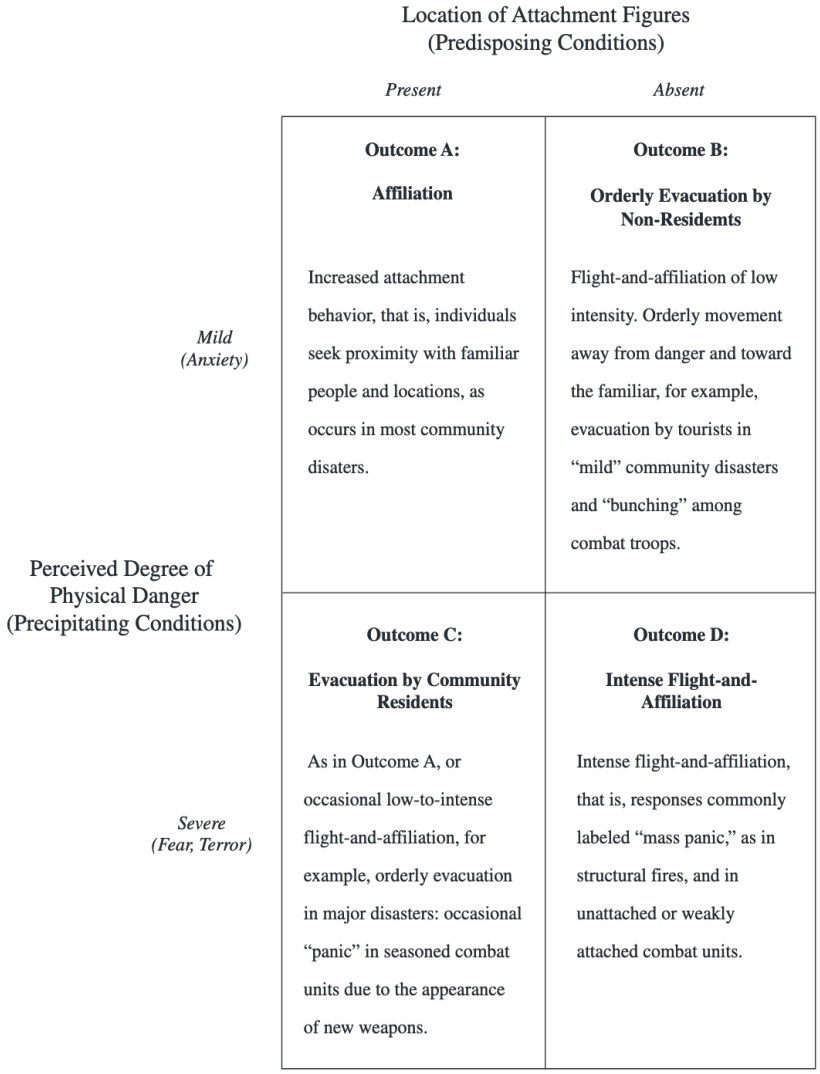

Figure 1: Topology of Outcomes

Similar to the subway study, the discusses how having some sort of familiarity seems to combat the panicky response that seems to be expected. Rather than immediately seeking to

escape from impending calamity, the article states that people first seek affiliation "seeking the proximity of familiar persons and places, even though this may involve approaching or remaining in a situation of danger."(2017). The article talks about how there are 4 different types of outcomes based on the degree of danger and the location of attachment figures. They are, affiliation, orderly evacuation by non-persons, evacuation by community residents, and intense flight-and-affiliation. According to how this is organized, it would be very unlikely to be in a situation where one does not have a sense of affiliation and a strong sense of danger. One could assume that you would be in more situations with one or the other, but rarely both. It should be noted that this idea of affiliation is not mutually exclusive to flight as animals and children have been observed to conduct flight towards things that they are familiar with (2017). Thus, even in events of panic, the first thing people seek is what they know and what they have come to trust.

This article again seems to point in the same direction as the previous study. People are going to trust in what they know and have a sense of attachment to. This strongly suggests that in these high-stress panic inducing situations, trust immediately becomes minimized to what they are the most familiar with, and more often than not it is placed in other people. Not every person, but people with a sense of authority or people very close to them. This article also seems to be favor of the idea that mass panic is likely to not occur even when stakes are higher. Previously in the prospectus section of this thesis, it questioned how herd/mob mentality could have an impact in one's ability to trust in a technology. However, it appears that this may not be that big of a factor after all since the odds of such an event occurring are considerably low. What can be a factor though, are people's ability or capacity to trust in technology over other people.

Philosophical/Ethical

Another aspect to consider in looking at the factors of people's trust in technology in high-stress situations are the ethical theories that may play into one's decision making. The two ethical theories that will be examined in these scenarios are utilitarianism and egoism. As discussed in the terms section, Utilitarianism is often associated with the prioritizing the happiness of many or maximizing happiness, and egoism is associated with doing whatever benefits an individual however that may take form (Driver, 2014). Beginning with utilitarianism, at least in the context of this thesis' technical portion, algorithms that are used to serve the public is generally created with a utilitarian approach. The logic here that you would want this algorithm to be efficient and maximize the effect it can have on people. In this case, for the technical project, it would be to try and maximize the safety and lives of the people who are being evacuated. A Utilitarian mindset could also be the premise for people who do choose to trust in this algorithm. For example, although they may not be incredibly certain they understand how the algorithm seeks to create safer evacuations, but they do understand that if they choose to follow it and not their own instincts, it would be better for the people around them. Egoism on the other hand, would run directly counter to this. Instead of being concerned with doing what will benefit the most people, those who adopt an egoism mindset and do whatever would benefit themselves the most ("Key ethics ideas", n.d). However, it is important to note that this does not necessarily mean that they would choose to not follow or trust what the algorithm is telling them. If they personally deem that either putting their trust or not putting their trust in the algorithm would most likely benefit them, then they would decide accordingly.

Based on the discussion in the research section above, it appears that a Utilitarian mindset is much more common than an egoist mindset in events of mass panic as people don't usually break down. People are more likely to make sure those around them are alright than outright

abandoning their morals and switching into self-preservation state. This is important to recognize as it would point into the direction that people may have an easier time with trusting the algorithm than not when stakes are raised. So long as there is this sense of authority behind the algorithm, people are likely to adopt a utilitarian mindset and be in favor of the algorithm.

STS Framework

One of the main two theories of Science, Technology, and Society, that is directly related with this issue is the theory of SCOT. SCOT stands for Social Construction of Technology. It is the idea that the success and failure of technological artifacts is a product of their social context ("Social construction of technology (SCOT)," 2009). In laymen's terms, how a society accepts a technology, including how it fits in with its social order. According to this theory, a technology or theory's adoption depends highly on its social reception and acceptance. This has a dual meaning as it also implies that the empirical results of said technology or theory don't actually have much weight in its adoptability.

This ties together very well with the main question behind this thesis. Despite the fact that certain technologies have a good track record of being able to accurately simulate different trends and in this case modes of travel, the research looks to be showing how things completely outside of the field in which the algorithm was created have impacted whether or not people will trust it. It is an interesting case where the adoption of the technology can be dependent on the different situations. As shown in Mawson's, "Understanding Mass Panic and Other Collective Responses to Threat and Disaster" however, things won't really go haywire until people are placed in highly dangerous situations with little to no affiliation. On one hand this makes adoption more likely. However, another possible outcome, however unlikely, is that in events of mass panic, people's trust could begin to breakdown. It has already been clear in the past two

articles that people begin to favor what is most closely known to them. In this case adoption might fall apart, but only for this situation, whereas in other situations, adoption may go even more smoothly.

Another important aspect in the SCOT theory are the social groups. It is a key part in the adoption of the technology as there will be certain groups that push or advocate for the adoption. There also may be groups that seek to deny a certain technology's adoption. In whatever case, the goals and intentions of the different groups or stakeholders also impact the adoption of a theory ("Social construction of technology (SCOT)," 2009). When discussing algorithms and whether or not people trust them, one group that might seek its adoption are city planners and officials, especially those involved in a safety committee. This group would have goals to minimize damages and loss of life, whilst handling problems in an efficient manner. In real world example, GovEx, the Center of Government Excellence released an algorithms toolkit for the local governments to use. In an interview with the head of GovEx, he mentions, "[There] is the everver-increasing volume of data that is around us every day. To cope with all this data, we need algorithms to understand it." (Bloomberg Cities, 2018). At a certain point, it becomes unfeasible to be able to handle problems that are constantly growing in scale. Not only does the mistake of human error become reduced, but cost and resource use are also minimized. Knowing this, it seems this group is in favor of trusting of algorithms in general.

While not necessarily a group, this is a collective of individuals that are concerned with their well-being. The goals of this group of this group do intersect somewhat with the goals of the other group, however they may be less concerned with the efficiency of handling the problem and more so the minimizing of damage. While it seems that governments may have a favorable stance towards them, the general public may have a harder time with trusting them. In a 2018

study by Pew Research Center on public attitudes towards algorithms, a survey was conducted which asked whether or not people felt algorithms making decisions with real-human consequences were acceptable (Smith, 2018). The categories were, criminal risk assessment, automated resume screening, automated video screening for interviews, and personal finance scores. In all fields, the majority of participants felt it was unacceptable to leave these decisions up to algorithms. Interestingly, one of the common reasons given were the removal of a human element and that humans are too complex. Basically, people put a lot more trust into humans because they feel that humans have a better track record, therefore, people have less trust in algorithms. This generalization is not accurate however. The same study states that whether or not people thought algorithms were acceptable were highly dependent on context (Smith, 2018). One of the things to note is that these fields have high amounts of subjectivity, whereas an algorithm meant for evacuation deals with data. 54% of the participants even stated that the personal finance algorithm would do a good job at determining good customers (Smith, 2018). Based on this it is fair to say that the general public can have trouble with trusting algorithms with subjective matters, but if it deals with more empirical subjects, they may have an easier time trusting it. Evidently, SCOT has a lot to do with this case and will be of aid in explaining the different behaviors and occurrences found.

Argument

Throughout this paper, it has been established how people will generally react when they are placed in a high-stress and potentially dangerous situation. To reiterate, it was found that as people are more unfamiliar with situations and surroundings, they tend to seek and find whatever they believe to be trustworthy, with other people or people in authority usually taking that role. Another phenomenon that occurs is that people will seek things that they have some sort of

affiliation with, whether it be people they have close ties with or an environment they know well. Taking both of these things into account, a possible explanation for why in the subway study people who were not familiar with the subway held less trust in the exit signs than the workers is because the workers are human. They are familiar with the societal role they have and can trust that they are competent enough to guide them. Meanwhile an exit sign is a mere concept and while usually people will be able to find familiarity in them, because they are experiencing a high-stress situation. It could then be argued that familiarity in a system also plays a highly contributory role.

Earlier in this thesis' prospectus, the idea of herd/mob mentality as a factor was considered. However, as examined in the second paper, mass panic events are quite uncommon in situations where panic-like reactions are assumed. Again, this paper states that familiarity and level danger are the main factors in monitoring the behavior of people, which commonly is to stick to what people believe they and know. In terms of ethical theories, both utilitarian and egotistical motivations were considered. However, the second study mentions how it is more common to see mutual aid rather than rampant self-preservation. This result points more towards utilitarianism as the main ethical framework people will utilize in times of crisis. It also points in favor of the idea that utilitarianism becomes more widely adopted in these situations, meaning trust in the algorithm might become easier and more widespread.

All this leads us in answering to what extent these social and ethical factors have on the adoption of said technology in high-stress situations. Based on this research, a conclusion that could be reached is that it is highly dependent on social psychological factors that are present. Whether or not people decide to put their trust in this algorithm depends highly on people's familiarity with not only the environment, the people, and the system, but also the algorithm

itself. For example, if the algorithm was used to calculate best case scenario for evacuation for the first time, it would not be surprising to expect some backlash and blatant ignorance of the data. However, with more continued use, people would be more willing to trust it, simply because they've become more familiar with the technology. Hence seeing the results and having anecdotal experience themselves versus purely relying on empirical evidence. Behavior that is highly reflective of the SCOT theory of Science, technology and Society.

This research also shows us that people will not go into complete instinctual, survival mode in the event of an emergency. This is telling that while it may be difficult to get everyone on board with following the results of a simulation, it is not outright impossible and people are rational enough to be convinced. On the ethical side of things, people will approach these situations with utilitarian-like frameworks in mind as shown in previous examples. Because the technology has a similar goal in maximizing happiness, people may favor trusting in the technology since it only reinforces this behavior. It could even be said that these high-stress situations might even aid in people's trust in the algorithm, however this also is based on their initial trust on the algorithm. In summation, social-psychological factors can play a huge role in how people place their trust, but overall, it would still be more likely that people choose to adopt these technologies in the moment of chaos rather than letting their instincts take over.

The socio-technical implications of this are important. Since algorithms are not developed in isolation, but by people, published usually by some sort of group or organization. The people's trust in the algorithm may depend to the trust in the group that is behind the algorithm. This is a strong example of SCOT as the group publishing this algorithm has their "theory" in the hands of another group, which in this case is the group of individuals. Not only is it important to develop technology with a good track record, but the group behind the creation of

the algorithm must be trustworthy as well. Much like in the subway example, the "staff" that people would look towards would be the ones involved with the algorithm and the "exit signs" would be the algorithm. Algorithms themselves are a great tool, but the social factor of trustworthiness and reputation must be considered when predicting people's reception and reaction. In the case of an algorithm used for evacuation purposes, the general public must have this perception of their local governments, or whoever was behind the development of the algorithm. Therefore, the major implication is that algorithm must have a group behind it that not only is trustworthy in the sense that it has a good reputation and positive perception, but it must also have a sense of authority behind it that people can look for during times of crisis.

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