Myths of Evacuation

This article deals with psychological aspects and human behaviour in exceptional circumstances. Laura Künzer

Evacuation planning is an important element of emergency planning for companies and organisations. In general terms, in evacuations people should make their way to a safe place. Situations such as fires, gas leaks, explosions, bomb threats or subsidence may be the reason for an evacuation. The people affected must leave (parts of) buildings or business premises on their own as quickly as possible and in an orderly manner. This is distinguished from a planned evacuation, e.g. as a result of bomb finds or foreseeable flood.

Evacuation planning must include four factors [1, 2]:

- the type of hazard or the triggering event, e.g. a fire
- the environment or infrastructure which is affected by structural properties such as length and accessibility of escape routes,
- the occasion on which people remain in a particular place, i.e. various challenges in evacuating an office building or an underground station, etc.,
- the humans involved by differentiating supportive forces such as the operators of an infrastructure, rescue and support services, organizers and fleeing people or people that need to be rescued.

This article focuses on the behaviour, responses and needs of humans in evacuations. A number of assumptions which are to some extent believed to be myths concerning human behaviour in evacuations are discussed in academic literature, but also among practitioners. Most of these myths derive from false understandings and misinterpretations of human behaviour; they are, however, often not recognized as such [3].

Myth: People leave the building immediately after hearing a fire alarm

Regular evacuation exercises have to be carried out in most types of infrastructures. It would therefore be obvious that people will also leave the affected infrastructure immediately as soon as a fire alarm starts.

Responses to such an alarm are always influenced by individual evaluation processes, recognition and motives. However, studies on fire evacuation exercises or case studies show (e.g. in [4] and [5]) that people often only start to evacuate with hesitation and delays or even refuse to evacuate a building. The authors Fitzpatrick and Milet [6] describe five phases after dismissing an emergency alert. Complex problems may arise in each phase, which may result in delays to leaving an infrastructure:

Phase 1: Hearing

Even if an alarm is transmitted by a public address system, it cannot be assumed that all intended recipients will take notice of the alarm, even if they have the physical ability. The non-hearing of alarms always results in delayed responses. To avoid this, the audibility of an alarm should be tested in a particular environment and adopted to surrounding influencing sounds (soundscape). It is also advisable to create redundancies in an alarm system, for example by using additional visual alarms (two sensory modes principle).

Phase 2: Understanding

The auditory perception of an alarm cannot be equated with the understanding of the alarm itself and the comprehension of the importance of this alarm. A fire alarm constitutes an acoustic warning signal which has an ambiguous meaning. The warning signal may be sensed as urgent by the recipients due to its tonal properties, but the hazard indicated and associated actions might not explicitly clear, especially if the recipients never heard the alarm before.

To avoid this, the significance of an acoustic fire alarm, for example the demand to leave the building immediately. If training courses are not possible due to different occupants, such as visitors of a building announcements with explicit behavioural recommendations should be used.

Phase 3: Identifying as an actual alarm

Human responses alarms are influenced by personal evaluation of factors such as the credibility, urgency and severity of the alarm. In the context of fire alarms
the so-called cry wolf-syndrome can be observed [7] and [2]. Previous “false alarms”, because alarms were presented in fire exercises, might decrease the credibility of an alarm, because recipients take alarms no longer seriously (“It is just an exercise…”). This may lead to behaviour such as completely ignoring the alarm, continuing current activities or even refusing to evacuate.

As it is not advisable to neglect exercises, the problem of alarm recognition should be addressed in organisational guidelines and debriefings of exercises. Also the knowledge about persons in charge or management to initiate an evacuation, play a significant role concerning the credibility of an alarm. The more credible the alarm the sooner will people start to evacuate.

Phase 4: Applying and recognizing as relevant

Personal risk assessment and the assessment of the credibility of an alarm play crucial roles in evacuation warnings. Only if people consider themselves to be the intended recipients of an alarm (“That’s an actual fire alarm, which is now important for me!”), they will respond appropriately and leave the building. If possible, specific information concerning the imminent danger may also help to increase the recognition of the relevance of an alarm.

Phase 5: Deciding and taking action

If a person has successfully completed phases 1 to 4, the person has to decide how to react to the alarm. Studies show (e.g. [4] and [8]) that after an alarm three behaviours in particular are exhibited:

- to wait for further instructions (“wait and see”)
- the active search for further information in order to make a more informed decision on how to react
- to actually leave the infrastructure

All phases described need to be considered for an effective warning to improve the initiation of an evacuation. Beside features for the design of warnings and alarms, e.g. volume, choice of words, etc., additional features for different user groups should also be included in the design process, e.g. for visitors who do not speak the local language.

**Myth: People use all available exits evenly**

Do the evacuees use all available escape routes?

In evacuation simulations is sometimes assumed that all available (emergency) exits are evenly used. Interviews and case studies show that people tend to use routes which can be considered as “common path of travel” [2] e.g. people use the same routes to enter and exit a building. There are various reasons why people neglect or even ignore available emergency exits:

- People are “creatures of habit” and feel more comfortable to use the routes they are acquainted with. Usually people do not pay attention to alternative exits in their everyday lives and in emergencies even use the exit which they also used as an entrance. Furthermore, signs which indicate escape routes and emergency exits, which are seen every day, lose their meanings if this information is not actively used (“learned irrelevance” [9]).
- Evacuation always constitutes an exceptional situation and may cause stress. Under stress, thinking and perception of evacuees are focused on the escape itself and the search for action alternatives is limited. Stressed and fearful people do what they can do best and stick to what is familiar (see [10],). So, they use familiar routes in order to eliminate additional stress [11]. In stressful situations, people also increasingly follow the behaviour of other people in their vicinity, even if they select an unfavourable route.
Alarm locks at emergency exit doors may create a psychological barrier for using alternative exits. The uncertainty of possibly triggering an alarm may discourage the use. Emergency exits are, furthermore, often less attractive because they are poorly signposted, lit or it is unclear to the user what is behind the emergency exit door. The disregard of (emergency) exits in evacuations constitutes a particular challenge to emergency routes planning and exercises. Emergency exits must be designed to be easily visible, attractive and inviting, e.g. through the use of light emergency lights. If possible, familiar entrances and exits should be parts of the escape routes. If a proper design is not possible, escape routes must be made familiar in order to be used in evacuations.

**Myth: People do not run through smoke**

Every child knows, smoke is hazardous, right?

In the event of a fire, the fire itself only constitutes a secondary risk to the health of people present. Poisonous smoke and toxic gases are considered to be the significantly greater danger [12]. What is common knowledge to the emergency services of the fire brigade, might not be as obvious to other people. People who have not dealt with the hazards of smoke are often unaware of the toxicity of smoke. Studies of fires in the past 30 years show that these hazards do not necessarily discourage people from running through smoke. People will still run through smoke even if there is a clear deterioration in conditions (poor visibility, breathing difficulties) due to the smoke [2], [13], [14]. The reasons for running through smoke can be describes by fire-fighting measures or attempts to warn and help others. Further explanations might be the aversion to the use of indirect routes, detours [15] and the misjudgement of the health risks due to the smoke toxicity. As people run through smoke, if there is a “good” reason for them to do so, such health risks must also be clarified.

**Myth: Panic usually occurs in evacuations and people behave selfishly**

Everyone for themselves?

In the context of evacuations, the term panic is readily used. (Mass)panic – the panic described here must be distinguished from panic disorders on clinical settings – is characterized by irrational, anti-social and selfish behaviour, i.e. self-rescue regardless of others [1]. Even if there seems to be a number of events which are in retrospect referred to as mass panic, “real” mass panic occurs very rarely. Although scientific literature agrees on this, the basic assumption is tenacious. Mass panic is therefore also described as a myth in research [16] and [17].

The (psychological or sociological) concept of mass panic has still not been sufficiently investigated. It can, however, be assumed that the behaviour of individuals is more functional from their perspective and thereby dependent on specific local circumstances as well as an individual assessment in relation to the courses of action. There is little empirical evidence for competitive behaviour or irrational behaviour patterns. A sense of duty, helpfulness and altruism [18] [19] has been found the analysis of events.
In fact, people often confuse their fear in exceptional circumstances with panic [13]. If the people are asked to describe their behaviour afterwards, it becomes clear that it was not panic-stricken. (“Then I burst into panic, called the fire brigade and saved my family.”) Furthermore, panic is used as a quick and simple explanation for serious accidents, e.g. by the media or event organizers. In order to avoid questions of responsibility and organisational reasons, a supposedly uncontrollable, irrational and selfishly acting mass of people is made responsible for a dangerous mass dynamic.

In order to prevent the emergence of a mass panic, the arrangements for dealing adequately with masses of people in exceptional circumstances must be established (crowd control). In addition, the phenomenon of mass panic must be further investigated.

### Conclusion and Implications for evacuations

The key factors type of hazard, the environment and the infrastructure, the cause of the evacuation and the people affected influence each other and must be integrated in an emergency evacuation plan. People are often only considered as uncertainty factor and source of errors. People can also be considered as safety factor and resource, because they can potentially respond flexible and goal-oriented in cases of emergency. But training is vital for this. In follow-ups of exercises and actual events, all available escape routes should be emphasised for the occupants. In debriefing, elaborated information about the emergency evacuation plan and correct behaviour should be provided and discussed. It is always necessary to review all actions in exercises for their effectiveness. In emergency situations, leadership by trained staff is also important; this should also be tested in exercises.

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**REFERENCES**


