

ENHANCING OCCUPANT RESPONSE THROUGH NEURO LINGUISTICS

Michael Dobbs
Umow Lai Pty Ltd
10 Yarra Street, South Yarra, Victoria 3141
Australia

Andy Fung
Umow Lai Pty Ltd
10 Yarra Street, South Yarra, Victoria 3141
Australia

ABSTRACT

Most of the time that an occupant warning system alert/alarm tone is heard, there is no real danger for building occupants. The perceived value of past positive reactions by occupants could detract from a similar response next time the same cue is received. The same cue may have less impact on occupants when repeated. Occupant warning systems should therefore be designed to communicate effectively so that occupants can make an informed choice to evacuate or delay. Effective communication can be optimised through a basic understanding of neuro-linguistic behaviour. This paper discusses the response of occupants relative to their communication preference and an optimisation of cues to enhance their decision making process.

INTRODUCTION

Upon recognition of the first fire cue, there is a decision to be made by building occupants, to evacuate immediately or delay. This paper is focussed on optimising the occupant warning measures to:

- Reduce the procrastination time;
- Add weight to the factors for evacuation; and
- Minimise the factors that delay evacuation.

If cues to evacuate are provided, they should be optimised so that the building occupants will identify with the situation and react immediately. Occupants generally make their own choices. Building designers are responsible for communicating effectively with them through the occupant warning measures. In many case studies of occupant behaviour in fire scenarios, it is found that the factors which delay evacuation outweigh the factors to evacuate immediately. This is illustrated in Figure 1.

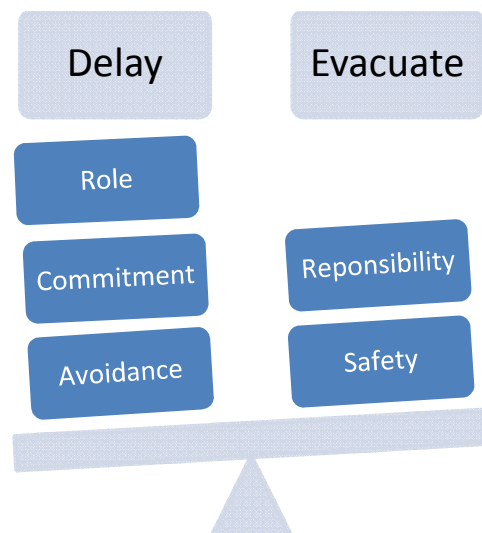


Figure 1: Factors delaying evacuation outweigh factors to evacuate immediately

CASE STUDIES

Refer to the case studies below where occupant behaviour has had an effect on occupant safety:

On the evening of November 18th 1987, at approximately 7:30pm, a small fire was reported to be present on one of the old wooden escalators at King's Cross underground station in London¹. By 7:45pm, the main ticket hall had been engulfed with flames and thick black, poisonous smoke. 31 people were killed and many more were injured². The King Cross tragedy highlighted various significant aspects of human behaviour in emergencies, particularly occupant commitment and roles in society.

Accounts from survivors and eye witnesses of the event describe people from the street still entering the station when smoke was clearly visible. In some accounts, survivors spoke of how they stopped and went to the toilet before continuing to

evacuate. Occupants were provided with a wide variety of cues, alerting them of the need to evacuate, however, some still chose to enter the station or continue on with their current activities. No sense of urgency was perceived from the fire cues provided, which included visual black smoke and heat. A possible explanation provided by Donald & Canter (1990) is that occupants interpreted the cues as being that there had been a fire rather than there might be a fire³.

Another case worth mentioning occurred on May 11th 1985, at the Bradford City Stadium in England⁴. 56 people died and over 256 people were injured when a fire began in the stadium whilst a football match was underway. Television footage showed that during the early stages of the fire occupants were reluctant to climb out of the stands and onto the 'sacred turf'. Only when police officers directed occupants onto the field did they begin to move⁵. Accounts also describe of occupants who were sitting a few meters away from the fire continuing to wait for the game to resume rather than evacuate⁶.



Figure 2: Fans watch as flames engulfed the Bradford City Stadium⁷

The case studies above are primarily for public venues. Detailed accounts of the experience of occupants from fires on four multi-storey office buildings where occupants were provided with vague cues have also been documented in a study by Brennan (1996)⁸. This study showed that people who responded quickly to the cues were more likely to be by themselves. When groups were formed, delays in the assessment of vague cues occurred until the fire cues became apparent and the decisions from a few with authority were generally accepted. The few occupants with authority within the office assumed key roles in an emergency situation.

SOCIO-PSYCHOLOGICAL CONCEPTS

In the past many researchers have investigated human responses to fires. Proulx (1994) emphasizes four socio-psychological concepts for analysing human response to fires⁹:

- Avoidance
- Commitment
- Affiliation

➤ Role.

These four socio-psychological concepts can be correlated back to the occupant behaviour observed in the case studies mentioned above.

- a) Avoidance is the act of minimizing the situation or denying that it exists. This concept has been shown to explain the consistently observed delay from initial fire cues. Avoidance can be commonly linked with occupants perceiving that a false alarm has occurred or that it is only another fire drill, rather than an actual fire event.
- b) Commitment is the act of continuing to engage in a specific activity which has commenced rather than paying attention to the current situation. In the King's Cross underground tragedy some occupants were so committed to catching their train and getting home that they were not even deterred by the smoke which was coming from the station¹⁰. Proulx (1994) suggests that this concept is linked with occupants conducting a cost-benefit analysis in their minds, which results in the idea that it is more beneficial for them to continue their current activity than to stop and deal with the current situation. Proulx (1994) states that, "people will continue with what they are doing for some time before paying attention to signs of a fire."¹¹
- c) Affiliation is the act of assembling together prior to evacuating. An example of this is that if a fire were to occur in a home, members of a family will generally evacuate together rather than separately. This means that evacuation will not occur instantaneously, and time is required for groups of people to assemble together prior to evacuating.
- d) Role, which defines a person's status in the building, also dictates how they will react to a fire cue. Employees/staff of a building will have a different response than visitors of a building. As employees/staff are more familiar with the building they may be more aware of the various escape routes available, however, visitors will have a tendency to listen to the directives of authority figures when within the building as would employees with employers.

With knowledge of these socio-psychological concepts this can better aid in the development of estimates of the time taken for occupants to commence evacuation or aid in developing a more effective means of communication that minimises the negative impact of the four concepts in the decision to evacuate. The figure below is a simplified diagram illustrating the events and associated factors controlling whether an occupant evacuates or delays evacuation. The four socio-psychological concepts control whether a person recognises the cue as a need to evacuate immediately and initiates evacuation.



Figure 3: Events and associated factors leading to evacuation or delay

Neuro-linguistics is considered by the writers as one means of communicating more effectively with building occupants by minimising the negative impact of the four socio-psychological concepts.

NEURO-LINGUISTICS

Our experiences and feelings affect the way we react to external stimuli. The brain may direct the signal, sequence it, change it based on our prior experience, or connect it to some other experience we have stored in our brain to convert it into thinking patterns and behaviours that are the essence of our experience of life¹². As a result, people react differently when presented with the same information, and these reactions can have extreme ranges. An audible fire alarm signal may cause some occupants to instantly move towards exits whilst others in the same situation may just as likely wait for the noise to stop without moving.

Communication preferences are a differentiator which can be utilised to optimise occupant response. Marketers and advertisers have been using these tools for years. They target their messages to seek a response from their intended audience to identify with the product. It is unlikely that the same product will appeal to everyone if marketed in the same way; rather products are directed towards people that have a certain communication preference with the objective that they will identify with and react in a positive way towards the product. People can be categorised by their communication preference as follows¹³:

- Visual;
- Auditory;
- Kinesthetic; and
- Digital.

Communication Preference	Characteristics
Visual	Visual Communicators pay most attention to what they are seeing. They usually focus on the big picture and place less focus on the details. Appearances are extremely important to Visual Communicators – both self and surroundings. Approximately 40% of the population have a visual preference and the majority of them are female. Typical jobs would include Graphic artists, Architects, Presenters and Entertainers.
Auditory	Auditory Communicators pay most attention to what they are hearing. They believe that the way that things sound is important and are great at listening. Information is perceived in the tone and delivery of an audible message. The audible environment is important including their choice of music, peace and quiet and the sound of running water in a water feature. They will often wear headphones to tune out the surroundings or move away from unpleasant sounds. Approximately 8-12% of the population have an auditory preference. Typical jobs would include Musicians, Councillors and Sound technicians.
Kinesthetic	Kinesthetic Communicators pay most attention to what they are feeling. They are generally concerned about their own feelings and the feelings of others. They are more emotional and will react to the vibe and energy perception in an environment. They tend to trust their instincts rather than justify their own decisions through logic. Approximately 40% of the population have a kinesthetic preference. They learn by being involved and doing tasks themselves. Typical jobs would include Therapists, Gardeners, Athletes, Childcare workers and Tradespeople.
Digital	Digital Communicators pay most attention to data, facts and figures. They like to know details and will base decisions on a logical choice of what will get the optimal outcome. They can be perceived as different by visual, auditory and kinesthetic communicators due to their preference of processing information and providing it. They account for only 5-8% of the population and are predominantly male. Typical jobs would include Doctors, Engineers, Accountants, Surveyors and Solicitors.

With the 4 different communication preferences, each group will generally perceive a situation similarly within a group and possibly very differently between groups. An occupant warning system that is designed to communicate that there is a fire in the building and a need to evacuate is relying on the perception of individuals from each abovementioned group interpreting and reacting in a uniform manner. The alarm is quite often the only cue delivered to the occupants and should therefore be designed to ensure that the likely perceptions of each group are considered. Further, if an occupancy is most likely to have a predominantly large number of occupants from one of these groups, then the cue could be tailored to ensure that there is a stronger association with the cue and therefore a greater likelihood of these occupants reacting.

It should be noted that communication preferences in individuals can be defined by more than one of the abovementioned preferences. Likewise, an individual's preference may be strong or subtle. Likewise, the occupations listed will generally have a higher proportion of individuals or greater tendency of individuals towards the associated communication preference. There are a proportion of cases that do not follow the trend described above.

DESIGNING FOR DIFFERENT COMMUNICATORS

Visual

Apart from a fundamental preservation for their own safety, Visual Communicators will try to “keep up appearances”. Where Visual Communicators may ignore an alarm tone, they are less likely to ignore other occupants evacuating. A mass evacuation would tend to provide peer pressure to the Visual Communicator to react in a positive way. Their aversion to being perceived as different in a negative way is a powerful method of persuasion. Their role is to be a part of the larger group and participation in an evacuation is perceived by others as the right thing to do.

Effective cues could involve actions by persons of authority who are perceived as the centre of attention, such as a manager, building owner, stage performers or a group leader. As stated earlier, employees have a greater tendency to listen to the directives of their employers. Announcements should ideally be originating from a person familiar to the occupants and someone that is looked up to. The perception that the Visual Communicator will appear different from the norm will encourage them to react. By following instructions from authority figures their commitment to the person of authority is maintained and should outweigh a commitment to a task.

In a situation where Sole Occupancy Units (SOUs) are somewhat isolated from each other and the decision is made by smaller groups such as families or individuals, a perception that everyone else is in the process of evacuating will reinforce that the Visual Communicator will be left out by not evacuating. By conveying this perception to smaller groups, the likelihood of avoidance will be less.

Where the occupancy has a visual focus such as a theatre, active train schedule or visual directives, the display should be removed or changed such that the occupants realise that the situation is different from normal and requires different behaviour. This interrupts their commitment to a particular task and draws their attention to the current situation. Basically, there is less incentive for the occupants to stay and more incentive to evacuate.

Live directives can include specific information about what to do and where to evacuate. Such that if individuals do not choose to evacuate, they will cause inconvenience upon others that then have to conduct rescue operations or delay returning to the building because everyone is not accounted for. With live directives, there is less need for occupants to investigate and it provides the occupants with guidance on how to affiliate with others in a chosen safe location.

Kinesthetic

Kinesthetic Communicators pay most attention to what they are feeling. To truly understand where they are coming from, we can look at the typical behaviours they

could relate to such as; winning a prize, succeeding in a competition, another's touch, being praised or amused. Conversely they will avert from criticism, uncomfortable surroundings, physical harm, boredom and awkward situations.

Being a large proportion of the population, it is likely that there are a significant proportion of Kinesthetic Communicators in a building. A potential danger is upsetting them to the point where they will simply refuse to move from their existing surroundings. This communication preference can be the most challenging to obtain a positive reaction from.

The cold hard fact that a fire may be in the building can be lost on the Kinesthetic Communicator, if they are otherwise engaged in a task that feels right to them. The most effective way of getting through to a Kinesthetic Communicator is by changing the feel of a place or pre-occupation. Make it uncomfortable! Change the environment to change the feel of the environment. A strong alarm sound throughout all areas of the building could cause them to move outside faster or conversely turn up the volume on their iPods. Cutting the internet connection or TV signal to the building will disrupt some pre-occupations. All these ideas are aimed at intruding into their space, interrupting their commitment to a current task and decreasing the likelihood that the alarm tone is mistaken for another false alarm.

Additional cues about the fire hazard such as the smell or sight of smoke will put a sense of perspective on the impending hazard. A well designed Heating, Ventilation and Air-Conditioning (HVAC) system, that provides automatic shutdown after a detectable but non-harmful quantity of smoke is circulated through the occupied areas of the building which noticeably changes the environment to the Kinesthetic Communicator is likely to be effective. The writers are not suggesting that this is a viable solution, but simply that it could be more effective, as it would interrupt their commitment to a particular task and draw their attention to the current situation, as well as decreasing the likelihood of avoidance.

Any focal point or activity in the building that sets the scene for the pleasant environment should cease, thereby breaking their current commitment; if necessary with the promise of recommencing after everyone returns to the building. The Kinesthetic Communicator will feel at ease with the thought that they can return to comfortable surroundings sooner if they react sooner.

As the Kinesthetic Communicator learns by doing, fire evacuation drills can be an effective means of training occupants as it puts affiliation into perspective through practice.

Auditory

Auditory Communicators pay most attention to what they are hearing. They pick up on sounds and are sensitive to the way that things sound. They will recognise the audible cue of a fire alarm quickly. However, knowing that the fire alarm has activated is not necessarily an assurance that they will evacuate. As sounds are important, the alarm tone itself can create a loud and uncomfortable auditory environment, breaking any commitment they may have to their current task. Like the Kinesthetic Communicators averting from the uncomfortable and the Visual

Communicators averting from unattractive surroundings, Auditory Communicators would tend to avert from unpleasant sounds.

Like the Kinesthetic Communicators, they may turn up the volume on their iPods if things do not sound to their liking and become reclusive.

A live message will mean more to an Auditory Communicator than a pre-recorded message or tone. Like the Visual Communicators, a familiar voice from a person that they know is more to identify with than a stranger. As Auditory Communicators gather information from the tone and delivery of a message, this kind of message combined with the insistent tone of voice and loud evacuation tones are more likely to provide Auditory Communicators with a sense of urgency increasing their likelihood of evacuating. The commitment to their current activity is more likely to be halted and action taken.

The case studies described earlier showed that occupants did not commence evacuation at the early stages of a fire as they did not sense the urgency of the situation. Provision of tailored evacuation messages aims at communicating a sense of urgency to occupants increasing the likelihood of a faster response. As with all types of communicators, to ensure prompt evacuation, management is required to promote effective response to a fire alarm/ evacuation tone.

Digital

When communicating with Digital Communicators, providing knowledge about the fire situation will equip them with the information that they need to make a logical decision. The more knowledge they gain, the better informed their decision. They are less likely to make a decision based on emotion. Digital Communicators are thirsty for knowledge and tend to be curious.

To improve the response of Digital Communicators, a live message or dedicated pre-recorded message can describe what is happening in the building and allow them to logically decide whether there is a need to evacuate. This provides them with all the information they require to conduct an assessment and allows them to make an informed decision as to whether they are at risk or not. The kinds of information Digital Communicators like to receive are:

- Where has the fire/smoke been detected?
- Which areas should evacuate?
- Has the fire brigade been notified?

Digital Communicators are also likely to follow the crowd and as such if they see other occupants evacuating they will tend to follow. This reaction is not a result of them trying to 'keep up appearances' like their visual counterpart, but due to them wanting to affiliate with the majority group and the figures pointing towards the possibility that others who are evacuating know something that they are yet to find out about.

Active sources of information such as digital signage are a focal point for Digital Communicators. In the event of a fire, these data sources should convey that things are not normal. This is aimed at breaking their commitment to their current task at hand and drawing their attention to the possible fire situation.

CONCLUSION

There are several tools available to building designers which enable effective communication with building occupants. As designers of occupant warning systems, we seek the attention of an audience just as an advertiser or marketer would. The tools are available for us to package our message for building safety in a relevant and directed way. Effective communication will increase the likelihood of an evacuation by occupants.

REFERENCES

- ¹ Donald, I., Canter, D., (1990), 'Behavioural Aspects of the King's Cross Disaster,' Fires and Human Behaviour, 2nd Ed, David Fulton Publishers, London, pg 15-18.
- ² Donald, I., Canter, D., (1990), 'Behavioural Aspects of the King's Cross Disaster,' Fires and Human Behaviour, 2nd Ed, David Fulton Publishers, London, pg 15.
- ³ Donald, I., Canter, D., (1990), 'Behavioural Aspects of the King's Cross Disaster,' Fires and Human Behaviour, 2nd Ed, David Fulton Publishers, London, pg 23.
- ⁴ BBC, 1985: Fans killed in Bradford stadium fire, Retrieved 25/01/09 from http://news.bbc.co.uk/onthisday/hi/dates/stories/may/11/newsid_2523000/2523561.stm.
- ⁵ Donald, I., Canter, D., (1990), 'Behavioural Aspects of the King's Cross Disaster,' Fires and Human Behaviour, 2nd Ed, David Fulton Publishers, London, pg 20.
- ⁶ Proulx, G., (1994), 'Human Response to Fires,' Fire Australia, August, pg 15.
- ⁷ BBC Sport, (11/05/05), Bradford remembers fire disaster, Retrieved 25/01/09 from http://newsimg.bbc.co.uk/media/images/41133000/jpg/_41133517_fire203.jpg.
- ⁸ Brennan, P., (1996), 'Impact of Social Interaction on Time to Begin Evacuation in Office Building Fires: Implications for Modelling Behaviour', Interflam '96, CESARE, VUT, Australia, pg 701.
- ⁹ Proulx, G., (1994), 'Human Response to Fires,' Fire Australia, August.
- ¹⁰ Donald, I., Canter, D., (1990), 'Behavioural Aspects of the King's Cross Disaster,' Fires and Human Behaviour, 2nd Ed, David Fulton Publishers, London, pg 22-24
- ¹¹ Proulx, G., (1994), 'Human Response to Fires,' Fire Australia, August, pg 15.
- ¹² Holistic Online, Retrieved 08/01/09 from <http://www.holisticonline.com>,
- ¹³ Fox, Gorman, Be a Charismatic Communicator, Life Performance Books, 2006,