



UNIVERSITY OF
GLOUCESTERSHIRE

This is a peer-reviewed, post-print (final draft post-refereeing) version of the following published document and is licensed under All Rights Reserved license:

Fullwood, C ORCID: 0000-0002-7714-6783, Martino, O I and Morris, N (2005) Multi-media packaging and ergonomic appraisal. Contemporary Ergonomics 2005. pp. 373-377.

EPrint URI: <https://eprints.glos.ac.uk/id/eprint/11804>

Disclaimer

The University of Gloucestershire has obtained warranties from all depositors as to their title in the material deposited and as to their right to deposit such material.

The University of Gloucestershire makes no representation or warranties of commercial utility, title, or fitness for a particular purpose or any other warranty, express or implied in respect of any material deposited.

The University of Gloucestershire makes no representation that the use of the materials will not infringe any patent, copyright, trademark or other property or proprietary rights.

The University of Gloucestershire accepts no liability for any infringement of intellectual property rights in any material deposited but will remove such material from public view pending investigation in the event of an allegation of any such infringement.

PLEASE SCROLL DOWN FOR TEXT.

MULTI-MEDIA PACKAGING: AN ERGONOMIC APPRAISAL

Chris Fullwood, Orsolina I. Martino and Neil Morris

*University of Wolverhampton, School of Applied Sciences, Psychology,
Millennium Building, Wolverhampton, WV1 1SB, UK.*

The main aim of a health and safety campaign is to persuade audiences to adopt or avoid certain types of behaviours. Subsequently, it is suggested that the manner in which this information is presented will be one important determining factor in the intervention's success. With the advent of inexpensive multi-media packaging it is possible to import great flexibility in design, combining sounds bites with graphical features. For example, one can use this to present images of celebrities or other icons. This review will consider the ergonomic factors which are important in the design of multi-media packaging.

Introduction

The need for public safety, for example in the home or in the workplace, requires the dissemination of information on health and safety issues. This information can be distributed to the public using a blend of technical resources so that it is presented in "multiple formats via multiple sensory modalities" (Schnotz and Lowe, 2003, pg 117). This approach is considered useful as it is assumed that it is easier to learn from materials that involve many media, partly because they are more stimulating (Hasebrook, 1995). Although health and safety information can be delivered via the use of more 'traditional' media (for example, television), the fact that computers are becoming more widespread (and in turn, so has access to the Internet), there now exists the possibility to make use of a variety of multimedia tools to design and distribute health and safety information easily, effectively and economically. For example, using MS PowerPoint (the most extensively used multimedia tool) one can deliver a variety of media, such as text, pictures, animation and sound bites (Reimann, 2003). Furthermore, this information can be sent to other individuals via email, or uploaded from the Internet.

The success of a health and safety intervention will ultimately be measured by whether or not it can persuade the public to either adopt a set of healthy behaviours or avoid certain risky behaviours. Analysing the impact that health and safety promotions have on the behaviour of the public however is potentially time consuming and difficult to measure in the long term. Therefore, it may be more suitable to consider using comprehension as a measure of effectiveness. In other words, does the audience understand the information that has been transmitted to them? One way to achieve this is by analysing the amount of information successfully remembered (Daneman and Carpenter, 1980). For example, in considering an anti-drugs campaign, this might involve an ability to recognise drugs as being harmful, as recognition of this kind has been correlated significantly with future drug use (e.g. Bachman et al 1988; Johnston, 1982). Although technological advancements have paved the way for facilitating the promotion of health and safety information, one must consider the design factors, which make multimedia packaging more effective. The following review will reflect

on the effects of animation, narrative style, mode of presentation, and the use of celebrities to promote health and safety.

Using animation

So, how can multimedia materials be designed in such a way as to make them more memorable? According to Downie et al (1990), information is more likely to be acknowledged and less likely to be forgotten if it is attractive and has instant appeal. Similarly Chebat et al (1995) noted that advertisements deemed as attractive also tended to be more memorable. One way in which multimedia materials can be made to look more attractive is through the inclusion of animation (Weiss et al, 2002). According to Lowe (2003), in recent years the use of animation (as opposed to static images) for instruction has increased. A number of researchers indicate that animation can have some positive benefits. Animations can be used to serve an attention gaining function. Hong et al (2004) suggest that 'flash' animation used on the Internet helps to attract the attention of users, however this does not help in the retention of the information. Koroghlanian and Klien (2004) also noted that children spent significantly more time using a computer programme about biology when animations were involved as opposed to static images. Large (1996) however suggests that animations generally fail to keep hold of attention once their novelty has worn off. Lowe (2003) suggests a number of reasons why animation may be ineffective: "a) the imposition on learners of excessive information processing demands (overwhelming) and b) a reduction in the extent to which learners engage in valuable processing activities (underwhelming)" (Lowe, 2003, pg. 158). Generally it would seem that animations, although impressive on a superficial level, do little to help with learning (Large, 1996).

Narrative style

The style of the narrative voice is also an important consideration in the design of multimedia materials. Mayer (2003) noted that a conversational style leads to information being processed at a deeper level compared to a formal style. Furthermore, this 'personalisation effect' was evident with on-screen text as well as narration. In the context of a health and safety campaign against smoking this might include, for example, referring to 'your cigarettes' as opposed to 'the cigarettes.' Mayer (2003) explains this finding by proposing that when messages are personalised, individuals are primed with a conversation schema, and therefore may be more disposed to believe that they are part of a human-to-human exchange. Furthermore, this disposition would result in the individual trying harder to understand what is being said.

Mode of presentation

The design of multimedia presentations can be developed further. Nugent (1982) illustrated that in the presentation of hazard information, the mode of presentation is crucial. When text, pictures and narration were combined, information was remembered more easily compared to when either of these individual elements was used to present the information alone. This suggests that presenting information in a number of different formats simultaneously has a positive effect on learning. Mayer and Moreno (2002) however indicate that cognitive load is an important consideration when it comes to designing multimedia presentations, especially if the intention is to remember the information accurately. Cognitive load theory (Chandler and Sweller, 1991; Sweller, 1999) promulgates that the design of an instructional message should reflect the capacity of the learner's cognitive system, and therefore should attempt not to cause overload.

Mayer and Moreno (2002) suggest that information is best presented in words and pictures rather than solely in words (multiple representation principle). When words are

presented on their own, an individual is less likely to construct a visual mental representation that connects with their verbal mental representation; however when words and visual material are presented simultaneously, the individual will be more likely to build visual and verbal representations, and make connections between the two (Mayer and Moreno, 2002). Furthermore, the integration of verbal and visual information (i.e., presenting corresponding words and pictures simultaneously rather than separately) results in better retention of the information (Sweller et al, 1998; Mayer and Moreno, 2002). This might include, for example, placing a text box next to a picture (Sweller et al, 1998). The limitations of human working memory are an explanation for this principle of contiguity. When words and pictures are presented at the same time, visual and verbal representations are more likely to be able to be held in working memory (Mayer and Moreno, 2002).

Evidence indicates that words are better presented as auditory narration than on-screen text (modality principle). Essentially, on-screen text will be processed through the visual system, along with any animation included in the presentation (Mayer and Moreno, 2002). For this reason, the text and the animation contend for our limited attention, producing a 'split attention effect' (Mousavi, Low and Sweller, 1995). However, if narration is used in the presentation, this information can be processed through the verbal channel, meaning that the visual channel is free to process the animation at a deeper level. This modality effect has also been demonstrated by a number of other researchers, and results in lower mental effort (Kalyuga et al, 1999), less time spent solving problems (Jeung et al, 1997), and improved memory for information (Mayer and Moreno, 1998). Findings from these studies may also be explained in terms of a "reduction in visual search" (Tabbers et al, 2004, pg 73).

The amount of information presented to the audience is also an important consideration. Multimedia presentations are better when they include fewer rather than many extraneous words and sounds (coherence principle). An explanation for this is that the irrelevant or extraneous material may fill working memory, and therefore prevent the learner from learning the relevant material (Mayer and Moreno, 2002). Tabbers et al (2004) advise caution in generalising the findings from such research, especially as they were conducted under experimental conditions in the laboratory, and that virtually all of these studies involved teaching participants about technical information.

Celebrities

Health and safety promotions often make use of celebrities, for example to promote road safety in Britain (Buckingham et al, 1999), and to speak out against drink driving in the United States (Slater, 1999). There are mixed findings for the effectiveness of using celebrities to promote health and safety behaviours. Borzekowski and Poussiant (2000) noted that celebrity spokespeople for anti-violence messages were less effective than accurate-looking characters in authentic situations. Brown and Basil (1995) on the other hand found that the American basketball player 'Magic' Johnson, was an effective spokesperson for HIV/AIDS prevention. The authors concluded that the persuasiveness of the message was caused by the fact that the public felt some form of involvement with the celebrity through media exposure.

For an explanation for this apparent difference, one could look to the advertising literature. Research seems to indicate that attitudes towards products are more favourable when the brand and the celebrity are congruent (Misra and Beatty, 1990; Cronin, 2004). In other words, the celebrity is perceived as more credible if they seem to be an appropriate match with the brand they are attempting to sell. For example, David Beckham would seem a likely candidate to sell football boots, but less congruent with the sale of junk food. The same may also hold true for celebrities promoting health and safety information. Therefore, it would seem that with an already established association between the celebrity and the branding, it is possible to build upon an existing schema or link, rather than having to build a new association. This also explains the findings of Till and Shimp (1998), who noted that

attitudes towards fictitious celebrities declined with the introduction of negative information about them, whereas the same did not hold true for actual celebrities.

Summary

In summary, it would seem that there are a number of design principles that can be employed for effective multimedia health and safety promotions. Information is more memorable if it is attractive, appealing, and includes a conversational style rather than a formal style. Static graphics are preferable to animation. Words and pictures are better than words alone, especially if they are presented simultaneously rather than separately. Auditory information is superior to on-screen text and the use of too many extraneous sounds or images has a negative impact on memory. Furthermore, the use of celebrities to promote health and safety is beneficial but more so if the celebrity and the branding are seen as congruent.

References

- Bachman, J.G., Johnston, L.D., & O'Malley, P.M. (1988). Explaining the recent decline in marijuana use: Differentiating the effects of perceived risks, disapproval, and general lifestyle factors, *Journal of Health, Society and Behaviour*, 29, 92-112.
- Borzekowski, D.L.G., & Poussaint, A.F. (2000). Common themes from the extremes: Using two methodologies to examine adolescents' perceptions of anti-violence public service announcements, *Journal of Adolescent Health*, 26, 164-175
- Brown, W.J., & Basil, M.D. (1995). Media celebrities and public health: Responses to "Magic" Johnson's HIV disclosure and its impact on AIDS risk and high-risk behaviours, *Health Communication*, 7(4), 345-370
- Buckingham, D., Davies, D., Jones, H., Kelley, P. (1999). *Children's television in Britain: History, discourse and policy*, British Film Institute: London
- Chandler, P., & Sweller, J. (1991). Cognitive load theory and the format of instruction. *Cognition and Instruction*, 8, 293-332.
- Chebat, J.C., Laroche, M., Badura, D., Filiatrault, P. (1995). Affect and memory in advertising: An empirical study of the compensatory processes, *Journal of Social Psychology*, 135 (4), 425-437.
- Cronin, J.N. (2004). The effect of celebrity endorsements on attitudes toward advertisements, brands, and purchase intentions, *Dissertations Abstracts International-section A-Humanities and Social Sciences*, 64(7A), 2570
- Daneman, M., & Carpenter, P. (1980). Individual differences in working memory and reading, *Journal of Verbal Learning and Verbal Behaviour*, 19, 450-466.
- Downie, R.S., Fyfe, C., & Tannahill, A. (1990). *Health promotion: models and values*, Oxford: Oxford University Press.
- Hasebrook, J.P. (1995). Learning with multimedia, *German Journal of Educational Psychology*, 9(2), 95-103.
- Hong, W., Thong, J.Y.L., & Tam, K.Y. (2004). Does Animation Attract Online Users' Attention? The Effects of Flash on Information Search Performance and Perceptions, *Information Systems Research*, 15(1), 60-86.
- Jeung, H., Chandler, P., & Sweller, J. (1997). The role of visual indicators in dual sensory mode instruction, *Educational Psychology*, 17, 329-343.
- Johnston, L.D. (1982). A review of the analysis of recent changes in marijuana use by American young people. In *Marijuana: The national impact of education*, New York: American Council on Marijuana, 8-13.
- Kalyuga, S., Chandler, P., & Sweller, J. (1999). Managing split-attention and redundancy in multimedia instruction, *Applied Cognitive Psychology*, 13, 351-371.

- Koroghlianian, C., & Klien, J.D. (2004). The effect of audio and animation in multimedia instruction, *Journal of Educational Multimedia and Hypermedia*, 13(1), 23-46.
- Large, A. (1996). Computer animation in an instructional environment. *Library and Information Science Research*, 18(1), 3-23.
- Lowe, R.K. (2003). Animation and learning: Selective processing of information in dynamic graphics, *Learning and Instruction*, 13, 157-176.
- Mayer, R.E. (2003). The promise of multimedia learning: Using the same instructional design methods across different media, *Learning and Instruction*, 13, 125-139.
- Mayer, R.E., & Moreno, R. (1998). Split-attention effect in multimedia learning: Evidence for dual processing systems in working memory, *Journal of Educational Psychology*, 90, 312-320.
- Mayer, R.E., & Moreno, R. (2002). Aids to computer-based multimedia learning, *Learning and Instruction*, 12, 107-119.
- Misra, S., & Beatty, S.E. (1990). Celebrity spokesperson and brand congruence: An assessment of recall and affect, *Journal of Business Research*, 21(2), 159-173
- Mousavi, S.Y., Low, R., & Sweller, J. (1995). Reducing cognitive load by mixing auditory and visual presentation modes, *Journal of Educational Psychology*, 87, 319-334.
- Nugent, G. (1982). Pictures, audio and print: Symbolic representation and effect on learning. *Educational Communication and Technology Journal*, 30, 163-174
- Reimann, P. (2003). Multimedia learning: beyond modality, *Learning and Instruction*, 13, 245-252.
- Schnotz, W., & Lowe, R.K. (2003). External and internal representations in multimedia learning, *Learning and Instruction*, 13, 117-123.
- Slater, M.D. (1999). Drinking and driving PSAs: A content analysis of behavioral influence strategies, *Journal of Alcohol and Drug Education*, 44, 68-81.
- Sweller, J. (1999). *Instructional design in technical areas*, Camberwell, Australia, ACER Press.
- Sweller, J., Van Merriëboer, J.J.G., & Paas, F. (1998). Cognitive architecture and instructional design, *Educational Psychology Review*, 10, 251-296.
- Tabbers, H.K., Martens, R.L., & Merriëboer, J.J.G. (2004). Multimedia instructions and cognitive load theory: Effects of modality and cueing, *British Journal of Educational Psychology*, 74, 71-81.
- Till, B.D., & Shimp, T.A. (1998). Endorsers in advertising: The case of negative celebrity information, *Journal of Advertising*, 27(1), 67-82
- Weiss, R.E., Knowlton, D.S., & Morrison, G.R. (2002). Principles for using animation in computer based instruction: Theoretical heuristics for effective design, *Computers in Human Behaviour*, 18, 465-477.