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Keywords

Comparison, Viewers, Cognitive, Psychophysiological, Responses, Threat, Appeal, Advertisements

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A Comparison of Viewers' Cognitive and Psychophysiological Responses to Threat-Appeal TV Advertisements

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Abstract

This study examines the emotional reactions experienced by viewers during threat appeal anti-speeding TV advertisements using both a cognitive continuous response measure of fear and a psychophysiological response measure of arousal. Static, post-only, self-report methods are typically used to obtain ad responses, however this study uses dynamic continuous response measures to gain a better picture of how viewers are responding throughout the entire ad. A comparison of the two different types of continuous response measures is made to determine if both measures produce similar or different results. Participants for the study watched one of four anti-speeding ads, with 20 participants per ad group (total n=80). Using responses from each type of measure, two graphs (patterns) were formed for each ad group. These graphs show divergence for three of the four ads tested, with only one of the ads evoking similar cognitive-fear and arousal responses. Road safety advertisers need to consider the measurement issues of each continuous response method when attempting to identify fear patterns in threat appeal TV advertisements ads as arousal can be caused by physiological reactions to fear-evoking stimuli and also other stimuli, such as exciting music and positive images.

Keywords: Threat appeals, fear patterns, continuous response measurement, skin conductance responses, road safety advertising

Introduction

Threat appeals can evoke emotions of fear, shock, disgust, anxiety, tenseness, and/or uneasiness in the viewing audience with the aim of grabbing the audience's attention and motivating them to act in a recommended way to avert the threat posed in the ad. Road safety advertising is an area of social marketing that heavily relies upon threat appeals to persuade their target audience (Henley and Donovan 1999) to adopt safe-driving behaviours. In more recent times road safety authorities have been relying on 'shock' tactics to alter people's perceptions of the dangers of speeding, drink-driving, or driving when tired, in the hope of improving drivers' behaviour/s. Shaver (1987, p.1076) describes a person's state when they feel fearful, as being an arousal of the autonomic nervous system in preparation for fright, "The person feels jittery and jumpy, perspires, trembles and looks quickly around". In the face of extreme fear people exhibit these physical reactions. It is difficult for road safety advertisers to create such reactions, however graphic shock ads can still cause physiological reactions, such as increased sweating and shivers.

Most studies that have previously investigated threat appeals have measured reactions to fear stimuli by using post-exposure static ratings of fear (via a questionnaire, for example "After seeing this ad, please indicate the extent to which you felt "fearful", "tense", "shocked", with a response scale of 0 to 3, 0 = not at all, 3 = extremely). However given that most threat

appeal advertisements are designed to generate fairly strong and perhaps volatile emotional reactions the validity of using a post-only *static* self-report method is questioned in this study, and alternative *continuous* response measures are proposed and examined.

It is acknowledged by Bagozzi, Copenath and Nyer (1999) that marketers know much less about the role of emotions in marketing behaviour in comparison to cognitive responses. They define emotion as "a mental state of readiness that arises from cognitive appraisals of events or thoughts. They are also accompanied by physiological processes quite often expressed physically" (1999, p.184). While there are many research papers that discuss emotion (cf Aaker, Stayman and Vezina 1988; Cacioppo 1999; Lang 1984; Lazarus 1986, 1991), Bagozzi, Copenath and Nyer (1999) note that research needs to further investigate the relationship between these two aspects (cognitive appraisals and physiological processes) of emotion. This study therefore measures ad responses in two different ways - cognitively and physiologically - in an attempt to explore this largely under researched area of marketing.

Patterns of Fear

Previous research has established two distinct types of fear patterns within anti-speeding advertisements – *fear-relief* and *rising fear* (Thornton and Rossiter 2003). A *pattern* of fear refers to the sequence of *fear* and *relief* felt by the audience during the advertisement. The purpose of investigating the concept of *patterns* of fear, is that drive-reduction theory (Hovland, Janis and Kelley 1953) suggests that it is not the *amount* of fear felt by the audience that drives behaviour, it is the sequence of fear arousal followed by fear reduction (relief) that is instrumental to attitude and behaviour change. A re-examination of this theory represents a distinct departure from the traditional investigation of "*levels*" of fear within threat appeal ads. Measuring an over-time *pattern* of fear within an ad involves different measurement techniques to measuring a level of fear (Vanden Abeele and MacLachlan 1994). For example, in the many previous studies investigating the optimal "level" of fear a retrospective post-only static measure of fear could represent the average fear, peak fear, or perhaps the fear felt at the final point, of an ad. In comparison a dynamic, temporal measure of fear would provide responses to each moment of the ad, thus providing a more comprehensive indicator of what degree of fear and/or relief the viewer is experiencing throughout the entire ad. This suggests that *how* fear is measured is of particular importance when investigating *patterns* of fear.

Measurement of Fear

A direct comparison of static, post-exposure ratings of fear (in questionnaires) and a continuous response measure (CRM) of fear (involving a dial measurement technique) for the set of ads investigated in this study was previously undertaken and reported (Thornton and Rossiter 2003). This current study extends this examination of measurement techniques used for gauging emotional reactions of fear, in the area of threat appeal anti-speeding TV advertisements, by comparing two types of CRM techniques – a cognitive dial measurement and a psychophysiological measurement.

Continuous Response Measure (CRM) 1 – Cognitive measurement of fear

A fear-relief continuous measurement dial (see Figure 1), was designed to obtain viewers' responses to threat appeal anti-speeding TV commercials, providing 10 readings per second. The dial records in a similar fashion to a "political worm" that is used during Australian

political debates to gauge viewers' like or dislike of a politician's opinions. However the labels on the dial in this study, which examines threat-appeal road safety television commercials, range from "very relieved" through to "very tense", with a "neutral" point in the middle of the dial.

Participants were verbally instructed as follows: "You are about to be shown a road safety commercial. Some ads are designed to make people feel a bit tense and we would like to map your reactions to the ad using this piece of equipment. It is a dial that you can move around while watching the ad. You start off with the dial in the middle at the neutral point. As you feel more tense, turn the dial to the *right*. The more you feel tense, the more you should turn the dial to the right, then back towards the center if you're feeling less tense. If and when you experience a feeling of relief while watching the ad, turn the dial to the *left* of the center point. The more relieved you feel, the more you should turn the dial to the left. When you feel neutral, turn the dial back to the center." The dial was labeled 1 to 5 on the left of the "neutral" point, with "very relieved" being located near 5, and on the right of the neutral point also 1 to 5, with "very tense" located near 5.

It is possible, however, that the CRM-dial is more of a cognitive measure of a participant's reaction to an ad rather than a pure and unobstructed emotional response to the ad, in that the viewer has to reflect on how they feel while watching the ad and translate this into moving the dial accordingly towards the labels of relief or tension. Additionally, the viewer's attention is divided between the ad and the task of moving the dial (Hazlett and Hazlett, 1999). In a realistic setting the viewer would not actually put their reactions into verbal terms, as emotion is not primarily a language-based experience and cognitive effort is required to put experience into words (Rogers 1983) as required in this exercise. Instead, it is more likely that a viewer would unconsciously process the stimuli and simply *feel* the emotions of fear and relief. To obtain a non-verbal, dynamic and unbiased response to a threat appeal ad, psychophysiological recording will be used.

Figure 1 –Dial recording device

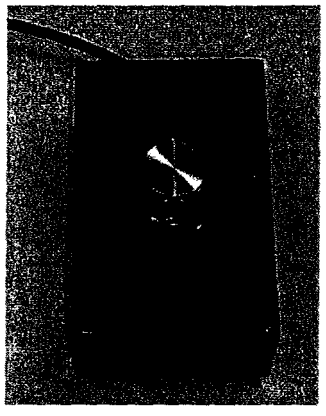
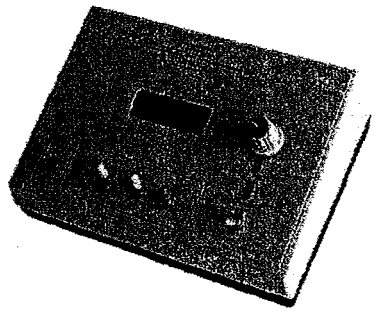


Figure 2 –Skin Conductance recording device



Continuous Response Measure (CRM) 2 –Psychophysiological Measurement of Arousal

A popular form of psychophysiological measurement within marketing is skin conductance response (SCR). Also referred to as Galvanic Skin Response (GSR) or Electrodermal Response (EDR), SCR records involuntary changes in the electrical activity of the skin, which is measured by the change in skin resistance (Krugman, 1965) which results from fluctuations

in electrical conductivity of the skin from a base level. Electrical activity is produced by the activity of the sweat glands that are distributed throughout the skin and are regulated by the autonomic nervous subsystems (LaBarbera and Tucciarone 1995).

SCR is a sensitive indicator of the internal psychological activity of respondents and is one of the most frequently applied activation indices (Krober-Riel 1979). A major reason for the frequency of its use is that SCR is easier to obtain than other psychophysiological measures, and has high correlation with other psychophysiological measures, for instance, Mewborn and Rogers' (1979) study found a high correlation (r =0.7) between heart rate and SCR. Previous studies by Lykken and Venables (1971), Burstein, Frenz, Bergeron and Epstein (1965) and McCurdy (1950) have demonstrated the validity and reliability of SCR and it has been used in previous marketing studies, for example, Kilbourne, Painton and Ridley (1985) successfully used SCR to determine psychophysiological reactions to different versions of subliminally embedded sexual images in advertising.
LaBarbera and Tucciarone (1995, p. 37) note that "because consumers have little voluntary control over their autonomic nervous systems, changes in bodily functions can be used by researchers to indicate the actual, unbiased amount of activation or *arousal* resulting from marketing stimuli". It is important to note that SCR measures *arousal,* which is not necessarily "fear" arousal, for example, it also measures arousal caused by excitement. Emotions have valence (positive and negative, pleasant/unpleasant) and intensity (low or high *arousal*).

It should be noted that skin conductance *response* refers to phasic data (short-term, that is, only a few seconds – see Figure 3), with phasic fluctuations referring to the fluctuations in electrical activity of the skin from a base level. Whereas skin conductance *level* refers to tonic data, where this measure reflects long-term averages of reactions to stimuli lasting a minimum if 30 seconds (see Figure 4) (Andreassi, 2000; Hopkins and Fletcher, 1994). This study tests TV advertisements, therefore skin conductance *levels* are reported. Additionally, SCL is also more relevant for reporting "patterns" of arousal within the commercial.

Figure 3 –SCR for Participant No. 6

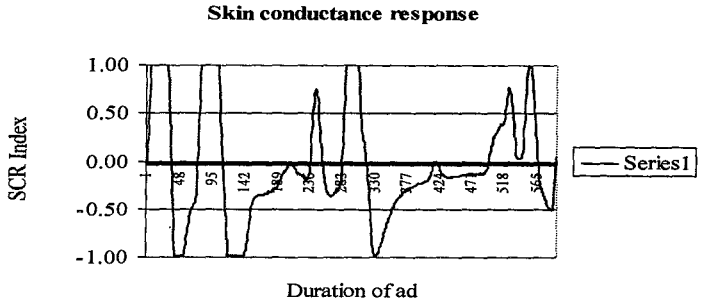
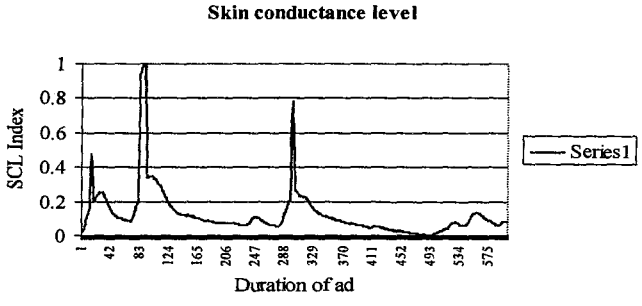


Figure 4 – SCL for Participant No. 6



Research Objective

To overcome the methodological limitations of previous research the purpose of this study is to compare dynamic CRM cognitive ratings of fear (using the dial) to dynamic CRM recordings of arousal (using skin conductance responses).

Method

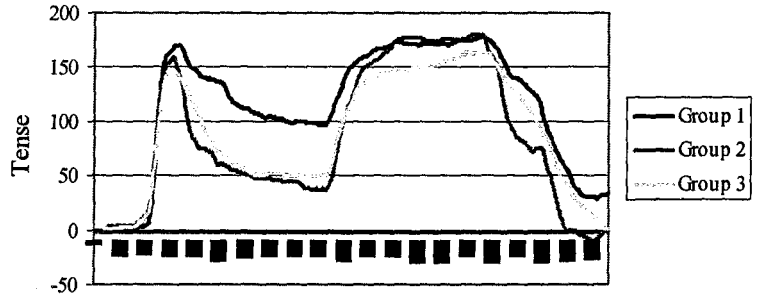
Television commercials were chosen as the stimuli for the study, as this would give greater control over the order of exposure to fear stimuli and fear reduction stimuli. Additionally, television commercials are a popular form of persuasive media used by road safety advertisers. A large set of road safety TV commercials were collected from road safety authorities around Australia with four advertisements eventually chosen for the study based upon their *common theme* of speeding in local streets and colliding with pedestrians as a result of speeding.

The data collected for the comparative analysis of the dial and psychophysiological responses was part of a larger study which was testing the effect of various anti-speeding advertisements on speeding intentions. Participants for the study were recruited using mall-intercepts. As an estimate, at least four out of ten people who were approached agreed to take part, with an incentive of a free movie ticket being used for generating high participation rates. A pre-questionnaire was used to obtain driving behaviour and demographics. The advertising experiment involved 80 participants, aged 18-25 years old. Each participant watched only one of the four advertisements. Four experimental groups (n=20 per group) were used to test the ads with quotas being set to evenly distribute participants by gender (10 males and 10 females) as previous studies using arousal measures have found that males produced higher skin conductance responses than females (Greenwald, Cook and Lang 1989).

Participants were tested individually in a lounge-room type setting. The same sample of participants were used to generate both the SCL data and Dial data, with SCL measures being taken on first exposure and dial responses on the second exposure to the same ad. It was considered more important to record first exposure responses using the skin conductance testing equipment as the participant needed to have a calm period prior to viewing the ad, to obtain a normal baseline period. Furthermore, order effects were not controlled for (that is a split sample design was not used), as previous groups had undertaken the dial measure with their first exposure (Groups 1 and 2 in Figure 5) as opposed to their second exposure (Group 3 in Figure 5). The same set of ads used in the current study were tested in a separate study that measured advertising wearout of threat appeal road safety ads using the dial measure, with the results showing that there is a small decrease in the emotional impact of the ad during the second exposure, however the pattern remains relatively similar (Thornton and Rossiter 2002). Essentially the dial is reliable in a test-retest sense, and while additional exposures may have an influence on the extent of effect they do not influence the pattern on the second exposure.

Figure 5

Reliability of the CRM-Dial for Ad 1 - Pizza

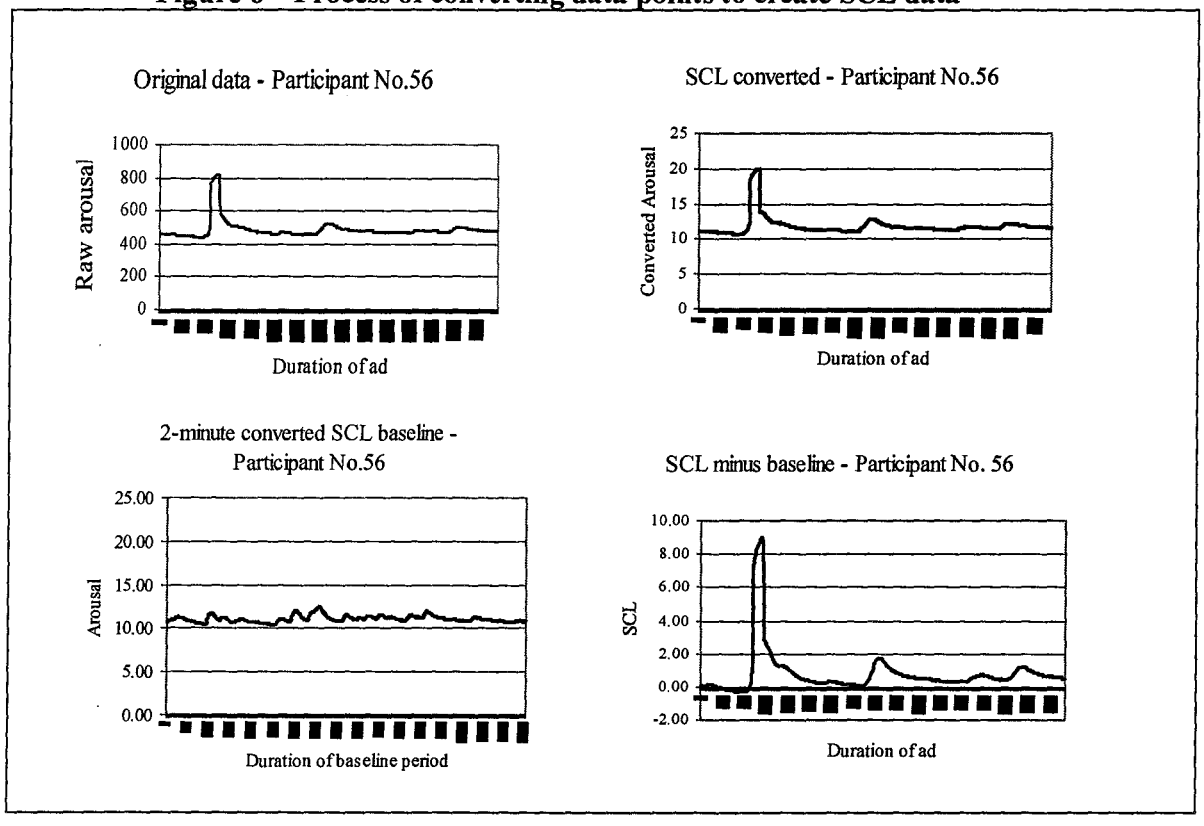


The skin conc Scope [August 2001] (see Fig s fitted to their

middle and index fingers. Participants were then verbally instructed to sit comfortably and quietly while they watched a black television screen with a white cross (+) on it for three minutes. The ad then immediately followed this 3-minute base line period. The finger-cuffs were then taken off the participants and they were handed the dial and given instructions. A second exposure of the ad occurred and dial recordings were taken.

Similar to the dial, the SCL recording equipment also takes 10 recordings per second, therefore, for a 60-second ad there are 600 data points. The SCL data was calculated as follows: from the initial data-point numbers that the Simple Scope provides (example of a data-point, 459) this number is multiplied by 100 and then divided by 4095 (example resulting in a number of 11.21, 2.d.p) to produce a number that is in *ohms*. An average baseline figure was calculated from the middle two minutes of the three minute baseline period (example, 11.08), this is then deducted from all of the converted SCL figures (11.21 – 11.08 = 0.13). An example of this conversion process in graphical form is presented in Figure 6 below.

Figure 6 – Process of converting data points to create SCL data



Results

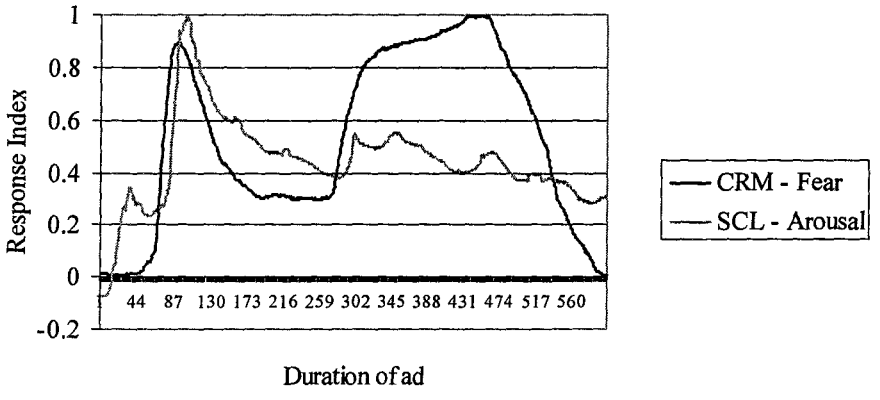
Using responses from each type of measure, two graphs were formed for each ad group, these being the cognitive-dial graph (labeled fear) and the skin conductance response graph (labeled arousal). Hopkins and Fletcher (1994) set a precautionary note about aggregating skin conductance responses, due to slight differences in reaction times between participants. For this study, each individual SCL graph was examined to ensure that the average responses were accurately reflecting peaks and key moments in the ads. Similarly, every individual CRM-dial graph was examined for anomalies (outlier graphs). The responses from both the

CRM-dial method and CRM-SCL method have been indexed for this current study to allow for a direct comparison of patterns. The graphs for each anti-speeding advertisement are shown in Figures 7 – 10.

Results for Ad 1

Ad 1 – Pizza (refer to Figure 7) shows a pedestrian being hit by a speeding car, a surgeon then providing commentary on how speed caused the fatal injuries, followed by a second scenario re-enacting in slow motion the pedestrian's body being hit by the car (fear component) and then a final recommendation by the surgeon to reduce speed with a different scenario showing a person driving below the speed limit who is able to stop their car and not hit the pedestrian (relief component). A comparison of the graphs shows that during the slow motion re-enactment of the body being hit by the car viewers indicate that they are feeling increasingly tense, yet there is only a very slight corresponding increase in arousal. The greatest arousal felt by viewers is from the initial shock caused by viewing the pedestrian being hit by the car. The different measurements of responses to this ad demonstrate that cognitive processing of the emotion/s felt during the ad is different to psychophysiological responses. The ad can be classified ad *fear-relief* regardless of which measure is used as participants' fear/arousal responses are greatly reduced at the end of the ad; however the cognitive-dial responses indicate that the viewer is feeling "neutral" at the end of the ad. It makes greater sense that some arousal would still remain after viewing such a shocking advertisement.

Figure 7 – Ad 1 Pizza – Comparison of CRM-Fear and CRM-

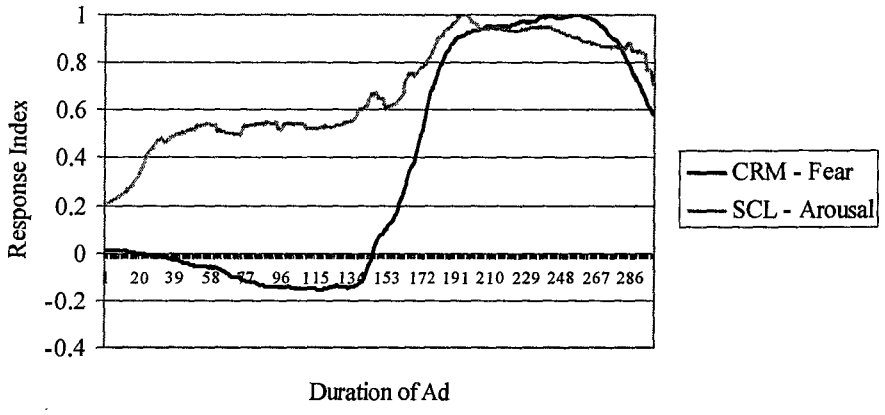


Results for Ad 2

Ad 2 – Trike (refer to Figure 8) shows visuals of children riding tricycles on a driveway with audio of a catchy and upbeat jingle; a child then rides his trike onto the road and is hit by a speeding motorist with audio of screeching brakes followed by a dramatized heartbeat sound (fear component). The Trike ad provides a good example of the limitations of using SCL as a measure of "fear" when testing threat appeal road safety ads. The SCL graph increases at the beginning of the ad where there is no indicator of a threatening situation. It is likely that the increased arousal is due to excitement caused by happy faces, brightly coloured tricycles and the upbeat tune in the ad. Arousal is then further increased by the shock of seeing the car run over the child. This ad is classified as ri*sing fear* (rising arousal) as the responses are sustained at a high level at the end of the ad, with fear/arousal built-up in the earlier seconds of the ad. Again, these graphs demonstrate a divergence between the measures. However, the

cognitive-dial graph does move towards "relieved" at the beginning of the ad, which relates to the positive images and sounds that also create arousal (excitement).

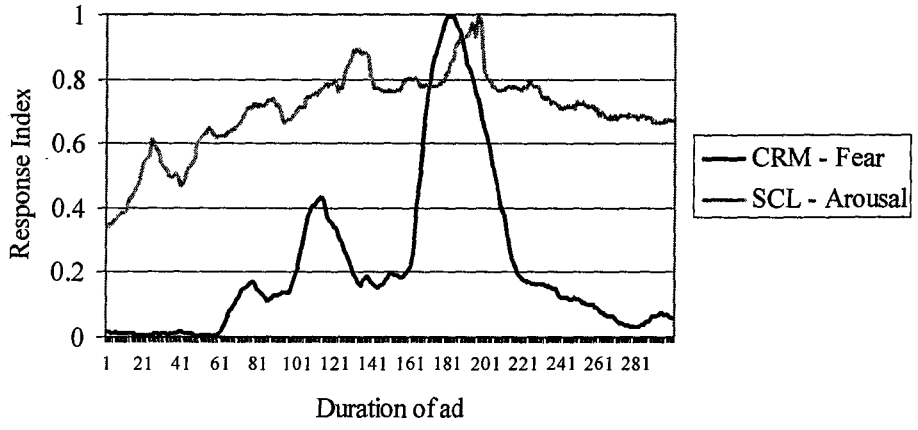
Figure 8 – Ad 2 Trike – Comparison of CRM-Fear and CRM-Arousal



Results for Ad 3

Ad 3 – Pram (refer to Figure 9) shows three different speeding scenarios with a car avoiding, frightening, then hitting a pedestrian (fear component), with information at the end of ad about stopping distances at different speeds, and a recommendation to drive slower in local streets (relief component). The Pram ad, classified as *fear-relief*, demonstrates that at the beginning of the ad viewers are feeling greater arousal than what is indicated using the dial recording. The "pattern" of fear/arousal is similar, however the level of the index differs between the measures. While the SCL still indicates arousal reduction at the end of the ad, the CRM-Fear measure accentuates the fear reduction. Again, it is expected that there would be some residual arousal at the end of the ad. Again, there is divergence between the responses.

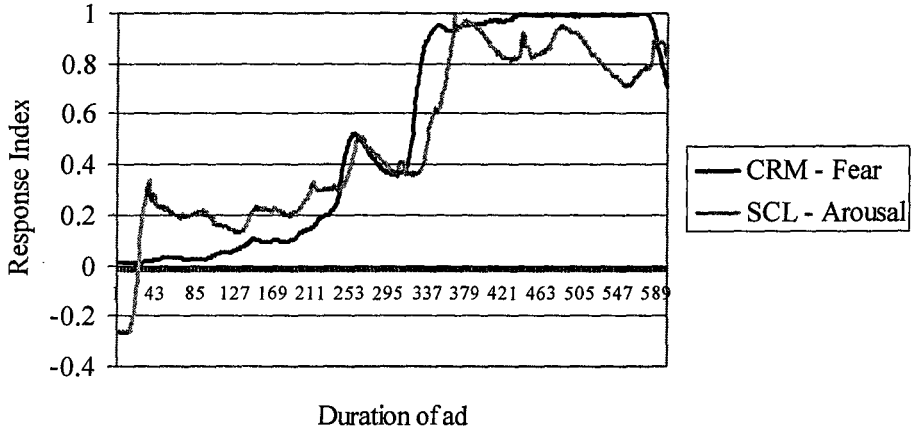
Figure 9 – Ad 3 Pram – Comparison of CRM-Fear and CRM-Arousal



Results for Ad 4

Ad 4 - 4WD (refer to Figure 10) shows a mother driving her children to school in a 4WD speeding along local streets; upon reaching the school she runs over a child crossing the road and kills him (fear component). Of all the four ads tested the 4WD graphs provide the closest patterns using the two different measures. Cognitive fear is similar to arousal in this particular instance. The end of the ad produces a sustained CRM-Fear response more so than the SCL-Arousal, however, overall the graphs are relatively consistent in depicting ad response. 4WD is classified as *rising fear* (rising arousal) as there is only the slightest decrease in fear/arousal at the end of the ad.

Figure 10 – Ad 4 4WD – Comparison of CRM-Fear and CRM-Arousal



It should be noted that the jump in the SCL arousal graphs at the beginning of each ad is mostly attributed to the onset of stimuli after the three minute baseline period. Another note to be made is that the peaks of the two graphs in most cases do not coincide mainly due to the differences in response times, that is, there is quite often a two to three second delay in participants' SCR, compared to their dial responses.

Discussion

The responses to Ads 1 to 3 indicate that viewers' cognitive evaluations of their feelings are different to their psychophysiological reactions to road safety advertisements. In all of the ads tested in this study as the viewers witness the point of impact they express that they are feeling "extremely tense" and their skin conductance responses also supports this feeling. However, after this point it appears that viewers can *believe* that they are still feeling tense, when they are actually feeling less tense (in a physiological sense), or vice versa.

The responses to the fourth ad, 4WD, using both measures appeared to reflect fear and arousal as similar constructs. It could be that the first three ads were stimulating other emotions (not labeled on the dial) that caused arousal, whereas the fourth ad stimulated only fear (expressed as tension) that caused arousal. However, while this is true for the Trike ad, it is not necessarily relevant to the Pizza and Pram ads, which were dominated by threatening stimuli. It can be seen that a major limitation of SCR is the inability to determine the directionality of the affect (like/dislike) component and in the instance of threat appeals it is not definite (although is highly likely) that the arousal is caused by fear. All that can be assumed, if changes in skin conductance occur, is that the viewer is feeling increased arousal. It is important to note that when using SCL to test threat appeal ads that are designed to evoke

fear, researchers should not use the label "fear" as SCL may indicate arousal caused by fear *and* arousal caused by other emotions, such as excitement.

Overall, it does appear from most of the graphs that viewers' cognitive appraisal of their emotions is different to their actual arousal. There are various sources of research that would support the use of EDR measures, such as SCR, over cognitive measures that require verbalizing feelings, such as the dial measure. Breckler's (1984) Attitude/Behaviour Discrepancy Theory is relevant to the findings of this study. This connection is highlighted by Hopkins and Fletcher (1994, p.113) opinion that the discrepancy between what we think of our reactions to stimuli and how we actually react to stimuli "undermines the validity and trustworthiness of normal communication research methods", thus making the SCR measure superior to cognitive measures. Other studies on the correspondence between EDR and cognitive measures "have revealed some relationships, but not very strong relationships" (Hopkins and Fletcher1994, p.126).

LaBarbera and Tucciarone (1995, p.49) interviewed *commercial* marketing practitioners and found from their study that "it is more accurate to rely on the GSR ratings" (compared to self-report data), using market-place responses as the dependent variable for commercial products and services. Similarly, Vaughn (1980, p.31) stated that "emotional arousal (autonomic, psychogalvanometer) tests may be more helpful in determining advertising effect". However, less is known about EDR measures in *social* marketing applications.

Limitations and Future Research Directions

The study shows that when using either measure the ads can still be classified according to "patterns" of *fear-relief* or *rising fear*. That is, the general characteristics of *fear-relief* pattern ads (Ads 1 and 3) is that during the middle component of the ad, peak fear is reached, and then the fear is reduced towards the end of the ad, which is often related to recommendations, resulting in relief felt by the viewer. Whereas *rising fear* pattern ads (Ads 2 and 4) demonstrate that there is no or very slight reduction in fear at the end of the ad. However, the extent of fear *reduction* caused by each ad is dependent on the measure being used.

Hovland, Janis and Kelley's (1953) Drive Reduction Theory requires the accurate measurement of *fear* reduction. This study has demonstrated that results will differ depending on *how* emotional reactions are measured. *Fear reduction* when measured by the dynamic CRM cognitive rating of fear (using the dial) is greater than the *fear (arousal) reduction* measured by the dynamic CRM recordings of arousal (using skin conductance responses) in all four ads. All ads end with a higher response index for arousal than for fear – which is probably best explained by the effect of *residual* arousal. Thus, despite support for the superiority of EDR over cognitive measures by other researchers, the residual arousal factor creates a complicating variable for the re-investigation of drive-reduction theory. This issue needs further investigation.

Additionally, this study does not identify which process (cognition or affect) is most effective for creating desirable behaviour change. Road safety advertisers would need to know which continuous response measure was better at identifying fear patterns and subsequently, which pattern of fear/arousal was most effective for predicting behaviour change. This issue will be addressed in future research by undertaking an advertising experiment which also includes a behavioural measure of speed-choice.

Conclusion

This study has used two *continuous* response measures (a cognitive dial measure of fear and skin conductance measure of arousal) to obtain ad reactions to threat appeal road safety ads as opposed to the traditional static, post-only self-report ad response measures frequently used by road safety advertisers. The graphs of responses produced in this study show how viewers react throughout an *entire* advertisement and provides a *pattern* of fear and *pattern* of arousal (respectively) for each of the four anti-speeding ads tested. There are several differences in the response indexes during particular points in three of the four ads, thus demonstrating that how viewers think they feel when exposed to advertising stimuli is quite different from their psychophysiological reaction to the same advertising stimuli. It is possible that the same underlying construct of fear arousal and reduction is being measured by the two different measures and *either* perhaps the viewer cannot accurately translate their physiological reactions into a cognitive appraisal of how they are feeling *or* the viewer is not conscious of how they are actually feeling physiologically (or most likely, a combination of these possibilities). It is more likely that the measures are identifying different constructs – *fear* and *arousal.*

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