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### **The impact of environmental cues in a corporate environment**

Harvey, Gareth

*Award date:*  
2012

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**THE IMPACT OF ENVIRONMENTAL CUES  
IN A CORPORATE ENVIRONMENT**

**Gareth J. Harvey  
School of Psychology  
Bangor University**

**July 2012**

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## Abstract

Marketers have been exploiting the ability of environmental cues to change customers' behaviour for over 150 years. However, it was not until Kotler (1973) coined the term atmospherics that academics started to systematically analyse their impact. To date, a considerable body of research has developed, explaining how these stimuli can change consumer behaviour. While marketers have embraced this research, both management scholars and practitioners have neglected to investigate how environmental cues can influence employees in a workplace context. This thesis seeks to address this gap by conducting a number of laboratory-based experiments simulating different workplace tasks, with environmental cues being manipulated to improve participant's behaviour and attitude.

This research is split into two sections. Firstly we demonstrate how traditional atmospheric variables (e.g. music and workplace posters) can change the way participants reflect on a simulated workplace task. While neither intervention has any positive impact on performance, we demonstrate that if motivational posters are used without prior planning, they can negatively impact performance. Secondly we demonstrate how digital signage can be used as an atmospheric variable.

A digital signs is a form of electronic display that can be used to present dynamic information on flat panel displays. This is selected as unlike other atmospheric interventions (e.g. aromas, music, etc.) where there is a start up cost associated with installing the infrastructure, many organisations already have digital signs installed throughout their offices. By carefully crafting the screens' content we are able to prime participants' to act with more integrity, improve participants' concentration, and decrease cyber slacking. Finally as digital signs are a new

communication medium, research is presented as to the optimum use of message repetition, variation and spacing to enhance message recall and liking.

## Acknowledgements

This thesis is the end result of a long journey and like any journey it has had its ups and downs. However, this journey would not have been possible without the financial backing of the Economic Social and Research Council (ESRC) and Pixel Inspiration and the academic support of my amazing supervisor Dr. James Intriligator. His encouragement, advice and vision has allowed me to develop as a researcher managing the transition between the business domain and psychological research. He has had to put up with reading numerous poorly written drafts and fixing numerous computer programs. Yet it is not only his academic guidance that I have appreciated but also his friendship.

Special thanks should also go to my PhD committee, Dr. John Parkinson and Dr. David Ingledeu for their guidance and suggestions. Their suggestions have always been insightful and have allowed me to develop and improve as an effective researcher.

A particular mention should go to my colleagues at the Bangor Motivation Collaboratory; in particular Fraser Bailey, Mandy Shanks, Rob Laing, Sofia Strömmer and Charlotte Wilkin. While some of you have made suggestions about research (some even useful!) and helped with data collection, what has been more important is your company, banter and a being a source of gossip on the days when motivation is lacking or when 'p' values are greater than 0.05. It has been a pleasure to share the adventure that is a PhD with you guys!

Possibly the three most important people for allowing me to complete my PhD are my Mum and Dad and Rachel, my girlfriend. Throughout the course of my PhD my parents have read numerous drafts (many at short notice), making my terrible

inarticulate writing readable! Yet their involvement is far greater than just proof reading. Their support from a young age allowed me to cope with my dyslexia and allowed me to contemplate studying at university. Without this support I wouldn't have been able to complete my undergraduate – let alone a PhD.

Along with Mum and Dad, Rachel needs a special mention. While Mum and Dad have had to cope with proof reading, Rachel has had to put up living with me! This means listening to me whinge on about my work on a daily basis and cope with me trying to finish my thesis rather than helping out round the house.

Finally, as I suspect that more people are likely to read the acknowledgements than will read any other part of this thesis, (hoping to see if they are mentioned), I will take this opportunity to thank a number of people; few who have had a direct impact on my thesis others, while many are just friends or who have made my experience at university more enjoyable or influence my journey to get to this point:

Adam Cope, Adrian Luescher, Alex Kirkham, Becky Fountain, Brian Jones, Chris Earing, Chris Snookes, Clair Doloriert, Darren Gelder, Dave Harbison, David Irish, Elspeth Braid, Gareth Griffiths, Heulwen Plant, Hazel Frost, Jennifer Harvey (icle sis), Kevin MacKenzie, Louise Ryan, Mike Peacock, Neil Harold, Nicholas Peatfield, Owain Rice, Rosie Holt, Sally Sambrook, Sam Cope, Sophie Linnet, Susan Barnes, Susanne Intriligator, Tim King, Tom Hecht, Tom Mills, Vicki Foster.

Despite the many friends who have made the PhD an enjoyable experience, it is also a lonely experience, sitting in an office alone facing a blank screen. On days like this it is worth thanking everybody at Radio 2, especially Ken Bruce, Simon Mayo and Richard Allinson along with the 'Test Match Special' Team who helped keep me company on many a long day in the office when the words failed to flow.

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## **Part A: Introduction**

## 1. Introduction

### **‘The Times They Are a-Changin’**

European businesses are currently facing some of the toughest operating conditions in living memory. In 2008, Europe entered the deepest recession since the 1930’s (Felstead, Green, & Jewson, 2011) and although this was technically over by 2010 (Hultén, Barron, & Bryson, 2011), consumer confidence has failed to return to pre-recessionary levels (Holland, 2012). But even if consumer confidence returns, European businesses are currently facing the most competitive environment. For most of the last century, European and North American businesses dominated the world economy but in the last two decades this world order has been challenged (Pradhan & Lazaroiu, 2011). Most notably we have seen the emergence and growth of companies located in Brazil, Russia, India and China (colloquially referred to as the BRIC economies), who, by 2050, are predicted to be the dominant supply of raw materials, manufactured goods and services (Cheng, Gutierrez, Mahajan, Shachmurove, & Shahrokhi, 2007).

This paradigm shift is not only of interest to economists, but has implications for managers located within ‘old-Europe’. Businesses based in the BRIC countries generate a competitive advantage by achieving a substantially lower labor cost in comparison to those located within old-Europe (Burke & Ng, 2006). This results in businesses based in old-Europe coming under competitive pressure from their BRIC counterparts (Havlik et al., 2009) and to remain competitive, businesses need to ensure they maximize their return from all of their assets (Barney, 1991), including their employees.

Historically, in an attempt to lower costs, businesses have looked to technological solutions such as automation (Wang, Keshavarzmanesh, Feng, & Buchal, 2009), the internet (Dreze & Hussherr, 2003), and the adoption of Computer Aided Manufacturing (CAM). While such approaches can and do improve organizational productivity, they neglect one important asset: employees. Businesses have become so focused on technological innovations that they have neglected innovations that centre on employee performance.

While employees are an organizational asset, they differ from other assets, in that they are human and thus have rights and emotions which influence their performance (Straw & Barsade, 1993; Straw, Sutton, & Pelled, 1994; Wright & Straw, 1999). While many believe humans are capable of reaching rational decisions and are not biased by external factors, this is not the case (Ariely, 2008; Kahneman & Tversky, 2000; Thaler & Sunstein, 2008; Tversky & Kahneman, 1974). Recently, the new field of behavioral economics has emerged which explains how social, cognitive and emotional factors bias our decision-making process so that humans make illogical but highly consistent decisions (Ariely, 2008). If managers can understand how environmental cues influence the decision making process, they can design environments that ‘nudge’ employees to become more productive, and reduce undesirable behavior (employee theft, employee turnover, deviance behavior, etc.) and promote desired behavior (teamwork, loyalty etc.).

While the field of behavioral economics is still relatively young, many of the techniques now being studied within this field have been embraced by retailers for over a century. For example, shop owners have been hanging Christmas decorations around shops for over 100 years before behavioral economics began documenting the power of nudges and situational cues. Retailers speculated correctly that by

decorating a store with environmental cues which were designed to trigger pleasant memories and the ‘Christmas Sprit’, customers would be more inclined to spend more money (Spangenberg, Grohmann, & Sprott, 2005). Nevertheless, in the 1970’s this marketing tactic started to receive the interest of academics. Kotler (1973) defined atmospherics as *“the conscious designing of space to create certain buyer effects. Specifically, the designing ... to produce specific emotional effects in the buyer that enhance purchase probability.”* This definition demonstrated that the impact of atmospherics is more complicated than just developing a store interior that consumers like.

To understand how environmental cues might be used in a corporate context, it is important to understand how such cues have been successfully implemented in retail contexts and to identify the underlying psychological mechanisms that produce these effects. Only once this is understood will it be possible to develop interventions that work in a corporate environment.

## **Atmospherics in the Retail Domain**

### **“In the mood’ for shopping?’**

When store designers plan a new retail space, one of their key objectives is to ensure that the space will induce a positive mood within their customers. Why? Previous research has shown that customers who are in a positive mood spend approximately 12 percent more than customers who are not (Babin & Darden, 1996). One explanation for this is that customers who are in a positive mood evaluate stimuli (in this case the products) in a more positive manner (Isen, Shalcker, Clark, & Karp, 1978;

Morris & Schnurr, 1989). Although it may initially appear that a consumer's emotions or moods are beyond the control of retailers, research from psychology suggests that an individual can be induced into a positive or negative mood via some surprisingly trivial manipulations. For example, presenting an individual with a small bag of sweets can induce a positive mood (Estrada, Isen, & Young, 1997) whereas, viewing a sad scene (Phillips, Smith, & Gilhooly, 2002) or listening to sad music will induce a negative mood (Martin, 1990). Consequently, Adcock (2011) advocates that by adjusting the store environment, retailers can influence consumer emotions. To induce a positive mood, retailers have a number of variables they can manipulate including factors such as background music, lighting, aromas, and shelving arrangement, to name a few. Although these variables can influence mood, we have also learnt that they can even influence customer behavior in a number of other ways.

## **Music**

At the most basic level, playing music which consumers perceive to be happy significantly increases their intention to shop at a store and increases the likelihood of repeat businesses (Broekemier, Marquardt, & Gentry, 2008; North & Hargreaves, 1996a) but it is not only the basic aspects of mood that can alter consumer behavior. Just as previous research has demonstrated that fast tempo music makes individuals drive faster (Brodsky, 2001), a similar phenomena can be seen in the retail domain with consumers more likely to move quicker around a retail environment which plays fast tempo background music compared to slower music (Milliman, 1982). This is important to retailers as Milliman's study also demonstrated that as customers slow



down (and consequently, their browsing time increases) sales volume (in terms of total spend) increases.

This change in behavior is usually modeled by the Yerkes-Dodson Law (YDL) (1908). This states that performance increases as a function of arousal, but once the point of optimum performance is reached, participant performance decreases as arousal increases resulting in a U-shaped graph. While this theory was initially developed looking at the performance of rats, the YDL has been shown to correctly model numerous situations in which environmental cues influence human performance (Lingling, Haur, & Chuan, 2008; North & Hargreaves, 1999).

Taking the YDL to an extreme: if the impact of tempo on customer shopping behavior accurately followed the YDL, this would suggest that playing music with a very slow tempo would decrease customers' arousal to such a point, that they are unlikely to make any purchases. Consequently, retailers need to find the balance between lowering customers arousal levels (to keep them in the shop longer), but still ensuring it is not so low that they are unlikely to make a purchase. Although such research has been conducted in a retail domain, these results have also been shown to occur in a restaurant environment (Milliman, 1986; North, Shilcock, & Hargreaves, 2003; Wilson, 2003). However, these research projects also revealed another interesting finding not connected to arousal. Customers total spend increased when classical music was played rather than when no music or popular music was played. More intriguingly, patrons who experienced ambient classical music spent significantly more on coffee, starter and deserts (items with a high profit margin) as well as the total on food (North et al., 2003). As classical music has the greatest impact on customers spending, this suggests that the result cannot be explained by the YDL.

Adcock (2011) advocates that music is also capable of conceptually priming customers. Conceptual priming is an implicit memory effect whereby exposure to an initial stimulus triggers semantically and lexically related information (Ferguson & Bargh, 2004) which can influence behavior. Numerous laboratory studies have demonstrated how powerful priming can be; for example participants primed to think about university professors performed significantly better on a trivial pursuit game than participants who were primed to think about supermodels (Dijksterhuis & van Knippenberg, 1998). This result is explained because professors are stereotypically associated as being intelligent whereas supermodels are associated as having below average intelligence. Consequently, participants who are primed to think about professors will have thoughts of intelligence activated, which leads to an improvement in performance compared to those primed to think about supermodels. In a restaurant context, consumers who were exposed to classical music, were primed to think about purchasing luxury goods (or at least more expensive items) as the stereotypical listener to classical music are thought to be upper-class and posh.

Further evidence to support the idea that classical music is capable of priming customers to purchase luxury goods comes from Areni and Kim (1993). They demonstrated that customers who entered a wine cellar purchased more expensive bottles of wine when classical music was played in comparison with 'top 40' music playing. Because they found customers purchased more expensive bottles of wine rather than simply purchasing more wine over all. This suggests that customers were primed rather than this being explained by the YDL.

However, music is not only capable of priming customers to purchase more expensive products. North, Hargreaves and McKendrick (1999) demonstrated that if a supermarket played French music, customers purchased more French wine, but if they

played German music, customers purchased more German wine. One of the surprising findings from this research, which demonstrates why this tactic is so popular, occurred during the exit interviews. Customers who bought wine were asked if they were aware of the background music and while only a limited number of customers could actually recall hearing any background music, no customers believed the music had any influence on their product choice.

Although priming is responsible for a number of surprising behavioral results, it can also be used to explain some common and yet confusing phenomenon. For example, it is a well-documented phenomenon that black students perform significantly worse than Caucasians students in exams (Steele & Aronson, 1995; Fryer & Levitt, 2004). Although there are numerous explanations for this result (including institutional racism), it seems highly likely that priming has an impact, although rather than calling it priming, the academic literature refers to it as Stereotype Threat Model (STM). STM is a specific form of priming that occurs when an individual from a social group is asked to complete a task which society perceives their social group to be weak at. By completing such a task the individual risks conforming to the stereotype. Consequently, this threat becomes so great that the participant ends up worrying about conforming to that stereotype and ends up performing poorly at the task (Steele and Aronson, 1995).

This phenomenon has been demonstrated in numerous laboratory-based studies (Steele and Aronson, 1995; Aronson, Lustina, Good, Keough, Steele, & Brown, 1999; Cadinu, Maass, Frigerio, Impagliazzo, Latinotti, 2003; Keller and Bless, 2008). For example, Cadinu et al. (2003) conducted an experiment in which a hundred black American soldiers, stationed in Italy were asked to complete a verbal reasoning task. However, before completing the verbal reasoning task, participants

were exposed to information which either activated their race or nationality stereotype. This was done by providing them information which read: *“Looking at research investigating performance differences in different areas of cognition, it has been shown that Blacks and Whites do not differ in most intellectual tests. However, there are some areas in which differences do emerge. One of these concerns verbal abilities. The graph below is based on the 72 studies conducted so far on race differences in verbal abilities. As you can see Blacks (or Whites), show, on average, higher scores than Whites (or Blacks) on tasks that evaluate verbal abilities”* (2003:278). However in the American-Italian condition, the term ‘black’ versus ‘white’ was substituted for ‘American’ versus ‘Italian’.

The results demonstrate that regardless of the condition a participant was assigned to, when they were provided with information predicting that they would struggle on the task, they did. This effect occurred regardless of whether they received information explaining the result based on their race or nationality stereotype. This controlled experiment clearly demonstrated that the discrepancy in performance could not be attributed to any difference in individual’s intellectual performance as participants were randomly assigned to each condition. The only logical explanation for this result is that participants were primed by being presented with information that predicted how they would perform.

Although, this is a form of priming, it is fundamentally different to conceptual priming. Conceptual priming activates semantically and lexically related information to the prime (Ferguson & Bargh, 2004), however, Cadinu et al. (2003) argued that STM causes participants to experience a feeling of increased anxiety at the risk of conforming to the stereotype. As a result of this anxiety participants experience, there performance drops.

The last major consideration when selecting the background music in a retail environment is the way in which it interacts with the sales staff. Although in the modern retail environment we have seen a move away from sales assistants, they are still used when it comes to selling luxury or high involvement goods. Sharma and Stafford (2000) suggested that sales assistants who are working in a prestigious environment (as shaped by environmental cues such as music) are more persuasive than those who do not, but the situation appears to be more complicated than Sharma and Stafford initially presented. If a participant is asked to complete a primary task where there is background music playing, it automatically increases their cognitive workload as they are trying to process multiple stimuli (Prichard, Korczynski, & Elmes, 2007). In a retail context the presence of background music can act as a distractor, preventing a customer from listening to the sales assistants' arguments (Chebat, Chebat, & Vaillant, 2001). This may not be a bad thing as sometimes a retailer may be aware that their product is inferior in comparison to their competitors. It is in these situations that a retailer may deliberately seek to use music to distract from their arguments. If a retailer has a weak argument, Chebat et al. suggest playing slow tempo background music as it provides customers with the opportunity to recall other thoughts and memories (and consequently they pay less attention to the sales staff). If this occurs, customers will start looking around the store for other cues as a guide to the product's quality; this could include the way the store is decorated, other customers in the store, or even the ambient aroma of the store (Babin & Darden, 1996; Morin, Dubé, & Chebat, 2007).

## Olfaction

Olfactory cues, otherwise known as ambient aromas have become another popular technique that retailers use to influence customers (Bone & Ellen, 1999). One reason for its popularity is because unlike other atmospheric variables, aromas can influence consumers without them having to pay conscious attention towards the aroma (Lorig, 1989). In reality, this means that consumers do not have to actively engage in smelling an aroma for it to influence their behavior (Ward, Davies, & Kooijman, 2007).

One of the first controlled experiments to demonstrate the power of ambient aromas in a retail environment occurred in a Las Vegas casino (Hirsch, 1995). Although a casino is not directly comparable to a retail domain, it does have a number of advantages from a research perspective. This is because the dependent measure in this experiment was the total spend on one-arm bandits and consequently, there was no human interaction between the gamblers and the sales staff, so any change in behavior could be attributed to the aroma's impact on the gamblers and could not be mediated by any human (e.g. sales assistant) behavior. Such a design avoids the potential experimenter effects that might have come into play with music and sales in Sharma and Stafford's (2000) study. In Hirsch's study a series of one-arm bandits were located with a faint ambient aroma, while in an identical room he had the same set up, but with no aroma present. Hirsch measured the amount of money spent on the one-arm bandits before the intervention and then again a weekend after the intervention. Although overall takings increased in the control set up by 3%, in the aroma condition, takings increased by 45%. However, when he replicated the study but with the same aroma but in a stronger concentration, takings increased up to 53%.

Unfortunately, simply increasing the potency of the ambient aroma is not always a simple way to increase the effectiveness of an aroma. Gulas & Bloch (1995) demonstrated that aromas which were pleasant in low doses, can become unpleasant as the concentration increases. In order to select the correct intensity level, retailers need to understand their target audience. This is because different demographics have different levels of smell acuity. Generally speaking, women have a stronger and more accurate sense of smell and as we age our sense of smell starts to deteriorate (Doty et al., 1984) and so retailers should adjust the intensity of the aromas based on the age and gender of their consumers.

Although accuracy changes based on age and gender, customers of different ages have different aroma preference. Retailers can use this to their advantage by creating ‘aroma zones’ to help segment the store (Turley & Chebat, 2002). For example Spangenberg, Crowley, and Henderson (1996) used an aroma to help differentiate the male and female clothing departments. A spicy honey-like aroma was defused through the menswear department whereas a subtle vanilla aroma was diffused through a women’s department. The results demonstrated that sales almost doubled under this configuration but in order to establish this was not just the effect of a pleasant ambient aroma, they reversed the aromas so that the masculine spiced honey aroma was paired with the female clothing and the vanilla aroma was paired with the menswear department. With this incongruent configuration, the sales volume was significantly below the baseline level.

Other retailers use aromas as a retrieval cue to help a service be more tangible. Over the last ten years there have been a number of service operators who have developed a signature aroma, however, the most notable of these was Singapore Airlines, who developed the Stefan Floridian Waters. This scent was then used as a

basis of the perfume that the air stewardesses wore, the hot towels that were distributed after meals, and the aroma was generally diffused throughout the airline (Lindström, 2005). Although passengers are unable to recall such a smell afterwards, it still acts as a retrieval cue and when a returning customer boards the plane and smells the aroma, it helps bring back memories of their previous experience with the brand which is known as the Proust effect. Similar tactics are now being used by shops to enhance the consumer experience. Victoria's Secret, one of the largest retailers of luxury lingerie, have developed a unique brand of potpourri, which is distributed throughout its stores and placed in the bags of the purchased product (Goldkuhl & Styvén, 2007). Consequently, even when the consumer opens the product at home, the aroma helps to reinforce the link with the store.

A possible explanation as to why aromas act as such effective retrieval cues lies in the human ability to recall aromas in comparison to other stimuli. Previous work exploring human's ability to recall verbal and visual information shows a steady and consistent decline in performance over time, with the greatest rate of decay immediately after exposure and then a constant rate occurs (Peterson & Peterson, 1959). However an individual's long-term recall for aromas is significantly different. Engen and Ross (1973) demonstrated that immediate post exposure recall of an aroma is considerably worse than visual stimuli, with only 70% of participants being able to accurately recall the aroma. In comparison, with visual stimuli participants experience almost perfect recall (99% accuracy) (Shepard, 1967). However, three months later there was almost no decline in recall rates of the aroma, whereas the recall rate of pictures had fallen to 58%. Consequently, olfactory retrieval cues may work well for luxury brands as these are infrequently purchased and customers may forget more traditional retrieval cues.



Although aromas are being used to help tantalize services, as the modern shopping environment has become increasingly sterile, aromas can also be used to help aid customers in the decision making process. Within supermarkets, products are increasingly appearing in packaging that prevents the customers from either touching or smelling the item (Underhill, 2000). This is a problem as customers use scents to help judge the quality of products. While it may be intuitive that we use olfactory cues to judge food products, aromas could also be a viable indicator of product quality, and consumers still use aromas to judge the quality of non-food products (Kotler, 1994; Morrin & Ratneshwar, 2000; Parsons, 2009; Spangenberg et al., 1996).

Despite consumers being unable to judge the quality of a car by its smell, this does not stop consumers from trying! In the mid 1990's Rolls Royce started to receive complaints that their new cars were not up to the same standard as their predecessors even though these new models were built using improved materials and more reliable production methods. This led Rolls Royce to conduct an extensive market research program which concluded that the complaints occurred due to a difference in smell of the new model. The new production methods had eliminated the smell of oil and wood and consequently because customers could no longer smell this they reached the decision that the car was not of the same quality. To tackle this problem, Rolls Royce invested both time and money in artificially developing this smell which was introduced into the cars and the complaints ceased (Lindström, 2005).

The use of aromas in a marketing domain has not just been used as a cue for product quality. Just as music is capable of priming customers to select a certain product, so can aromas. Customers in a travel agents shop who are exposed to the background aroma of coconut oil are more likely to select a beach holiday than those who are not (McDonnell, 2002). This occurs due to the smell of coconut and its aroma

linking to suntan lotion, consequently priming customers to think of beach holidays. The use of product specific aromas does come without a risk. While they are likely to increase the sales of the targeted product, they are not likely to increase sales overall (Spangenberg et al., 1996). Consequently, the idea that the aroma of fresh bread increases a supermarkets profit may not be exactly true. While it is likely to increase the sales of baked goods, this could come at the expense of other products, which may have a higher profit margin. Consequently, retailers are more interested in the use of ambient aromas than product specific aromas (Moorin & Ratneshwar, 2003)

While the impact of music and aromas are very similar, one area that is different is the ability of an aroma to induce a positive mood. Although a number of scholars have suggested that aromas can be used to influence participant mood, (Diego et al., 1998; Kiecolt-Glaser et al., 2008). Bone and Ellen (1999) conducted a meta-analysis on the mood induction properties of aromas and concluded that there is not sufficient evidence to support the assertion that aromas can induce moods. Yet while aromas may not be capable of inducing a mood, they can influence participants perceived stress levels. During a shopping visit one of the most frustrating experiences is queuing (Nosek & Wilson, 2001; Taylor, 1994), but by carefully controlling the aroma in the store McDonnell (2002) suggested that a retailer could significantly reduce the level of stress experienced by customers.

### **The Present Research**

In all previous cases retailers have used environmental cues to increase a store's profitability, but what differs is the way they have tried to achieve this objective. In some cases they have used aromas, in others they have used lighting,

music, or variants of other priming-related methodologies. We believe the same psychological mechanisms could be used to tackle a range of challenges within a corporate domain. In a corporate context employees can serve to generate a competitive advantage, but for this to happen effectively, they need to be managed properly. For example, Barlow, Bean, and Hott (2003) estimated that between 30-65% of all Internet usage in the workplace is not work related. The cumulative effect of this cyber loafing is estimated to cost the US economy an estimated \$54 billion each year (Lim, 2002). Employees who engage in cyber loafing are stealing both time and resources from their employers, however employee theft is not a new problem (Greenberg & Barling, 1996). The Association of Certified Fraud Examiners (2008) estimated that the US economy lost approximately \$994 billion to white-collar crime in 2008, suggesting that the typical US organization loses 7% of its annual revenues to white-collar crime (Association of Certified Fraud Examiners, 2008).

While both cyber loafing and employee theft are behaviors which businesses want to discourage, there are many other behaviors that they want to promote. For example, managers are constantly looking for new techniques to motivate employees (Herzberg, 1987; Wiley, 1997) and improve job satisfaction and task performance. However, to get the best out their employees, managers need to recognize the pivotal role that emotions play in the workplace. Employee psychological well being, mood, and job satisfaction all impact upon employee performance and thus ultimately influence employee turnover and company profitability (Wright & Bonett, 2007).

While it may be obvious why poor performance is bad for business, the impact of high turnover is not so obvious. Organizations that experience a high level of employee turnover incur a substantial cost. While there is no simple equation to calculate the cost of employee turnover, Bliss (2008) provided a simple ‘rule of

thumb' estimating that the costs associated with replacing a staff member could add up to more than 150% of the salary of the employee being replaced. Although this cost estimate may sound high, other authors have reported similarly high figures. For example, Ton & Huckman (2008) estimated that the cost of replacing an employee earning \$8 per hour was between \$3,500 and \$25,000.

While marketers have recognized and exploited human irrationality and human biases to gain a competitive advantage in the marketplace, the same cannot be said for other business domains. In this thesis we will seek to explore whether atmospherics can be used within a corporate domain to improve a range of behaviors which ultimately can improve an organization's profitability.

To achieve this objective we will use two different techniques. First, we will explore how traditional forms of atmospherics (music, aromas, and "in-store displays") can be used in a corporate domain. However, in recent years a new communication channel has found its way into corporate offices: the digital sign. A digital sign or Digital Sign Network (DSN) is "the generic term for any digital display system that receives content from a centralized control system that is capable of controlling the content in a flexible and dynamic way." (Intriligator, 2008:5). Although such displays look like flat-screen televisions, as they share the same hardware, the content they display is significantly different as it can display corporate messages, Internet websites, customized content, as well as videos. While at first a DSN may not appear to be an atmospheric variable, Berman and Evans (1995) classified atmospherics into four categories: External variables, general interior variable, layout and design variable, and point-of-purchase and decoration variables. Using this classification Turley and Milliman (2000) clearly believe that signage (including digital signage) is classed as a 'point of purchase and decoration'.

However, Digital Signs were singled out for specific investigation as unlike other atmospheric interventions (e.g. aromas, music, etc.) where there is a significant start-up cost, (e.g. installing the infrastructure), many organizations already have digital signs installed throughout their offices, as they are frequently used for internal communications. Because they are used for internal communications, they are located in positions which ensure employees get maximum exposure to the stimuli.

An alternative to using digital signs would have been traditional static posters. These would have been considerably cheaper to use than digital signs, however they have a number of specific limitations that restrict their use. Firstly, although posters can be created relatively quickly and easily, the challenges are concerned with distributing these posters and ensuring that they are placed on walls. The second and potentially more worrying concern is that we speculated that traditional static posters are ineffective at capturing participant's attention. Yet despite conducting a review of the literature, no evidence was found that either supported or rejected our hypothesis. Consequently to test this assumption, a pilot study was conducted within a supermarket context. Although a supermarket is significantly different from an office environment, it was selected because of the high footfall a supermarket experiences. Consequently over a two-day experiment, we could expose significantly more participants to our experimental poster in a supermarket context than we could in an office environment.

On the first day of our pilot study, a large poster was placed on the end of a shopping trolley with the message "*Are you observant? Do you notice things? Claim your £10 reward from the person pushing this trolley for indicating this sign.*" (See Figure 1)



*Figure 1: Example poster used in the pilot study*

This poster was displayed for eight hours and yet despite the long duration and high volume of customers who saw the message, not one customer responded to the message. On the second day, the experiment was repeated but a larger version of the poster was placed directly in front of the entrance to the store (instead of on the trolley). All customers entering the store would have looked directly at the poster. The message on this poster was identical to the message displayed on the trolley except instead of asking customers to talk to the person pushing the trolley; they should go to the customer service desk (5m away from the poster). Despite the larger sign and the large footfall next to the sign only two customers claimed the reward. This demonstrates traditional posters are an ineffective tool to capture customer's attention in a retail domain and we see no reason why this will be different in a corporate context.

While traditional signs are ineffective, new evidence suggests that digital signs are still perceived as novel and consequently capture attention (Schaeffler,

2008). Not only can they capture attention, but they also offer managers a guaranteed distribution channel.

However, although research suggests that digital signs can be effective communication channels, it does not suggest how this medium could or should be used. To tackle this question we decided to look at how managers have attempted to change behavior via traditional posters and replicate these effects using digital signs. For example, in an attempt to increase employees' productivity managers have displayed motivational posters on office walls for over a hundred years. Yet despite this long history, a review of the literature revealed no evidence that these posters have any impact on behavior. Consequently we decided to test if motivational posters can impact employees' behavior and if they do, we aimed to try and understand what psychological mechanisms are responsible for the change.

The use of Digital Signs could be conceived as a form of advertising. In order to improve the effectiveness of advertising psychologists have researched how a message should be framed to increase its persuasiveness (Cialdini, 1993).

Consequently, a considerable body of literature now exists demonstrating the best way to frame messages designed to promote health related causes (e.g. see Rothman, Salovey, Antone, Keogh & Martin, 1992 for a discussion). Of all the techniques used, one of the most popular is social norms (Cialdini, Demaine, Sagarin, Barrett, Rhoads & Winter, 2006). This works by providing the target audience with information of how their peers are behaving. Consequently, participants adjust their behavior so that they act in a similar way to their peers. So if a health psychologist wanted to reduce alcohol consumption in 18- 25 years olds they could run an advertising campaign with the following message "*80% of 18-24 years olds only drink three pints on a night out*"

rather than promoting the health benefits of reducing alcohol consumption.

Considering the well-established literature developed by psychologists for use in advertisements, it seems logical to test whether these mechanisms can be used to influence employees' behavior, as currently this is untested.

However, social norms form only one part of the wider field of behavioral economics. This new discipline focuses on how social, cognitive and emotional factors influence the decision making process. While social norms have been shown to influence our decision making, new evidence suggests that exposure to stimuli before we actually make our decision can also influence our behavior, a process known as priming (e.g. See Ariely, 2008 for a discussion). Outside of the laboratory environment this process occurs all of the time. For example, if we walked past a luxury jeweler on our way to the shops, this may prime us to think of spending more money later in the day. In a workplace environment, it could be hypothesized that the content on the digital sign could be used to prime desirable behaviors within employees. However as there is currently no evidence to suggest if this is the case we decided to test it.

The design of our final experiment was also influenced by recent developments within behavioral economics. While our social norming experiment looked at the social aspect of behavioral economics and the priming experiment looked at the cognitive role, our third study considered the role of emotions in the workplace.

It is well known that employees who work in offices without exposure to windows experience increased rates of depression and tension (Sundstrom, 1981) and this results in lower productivity levels (Berman, Jonides, & Kaplan, 2008). While it



is impractical to install a window in every office, a digital sign is capable of displaying both images that constantly change and videos. Consequently, we wondered whether it would be possible to use a digital sign to recreate the presence of a window.

**Part B: Traditional Atmospheric Cues in a Corporate Environment**

## **2. Motivational Posters: Not So Motivational After All?**

### **Introduction**

#### **Positive psychology in the workplace**

Over the last 80 years clinical psychology has primarily focused on human weaknesses and disabilities (Carr, 2009) (e.g. clinical depression, phobias, addiction mental, illness etc.). However, over the last decade, a growing number of psychologists have started to focus on the more positive side of the human condition – discussing such phenomena as human strength, resilience, and the associated benefits of being happy (Luthans, 2002). Although this approach originated within the psychological literature, academics within the business domain have recognized that this new approach can also be applied within the domain of business (Graham, Eggers, & Sukhtankar, 2004; Wright, 2003; Youssef & Luthans, 2007).

When management was first developing as a discipline in its own right, employees were viewed similar to other “machines” in the workplace. Managers failed to recognize the extent to which human emotions could impact employee behavior (e.g. Fayol, 1916; Taylor, 1923). Furthermore, because managers believed that employee mood had little impact on workplace performance, there was little or no incentive for management to care if employees were in a positive or negative mood. However, with the new interest in positive organizational behavior, the impact of emotions in the workplace has received a substantial amount of attention, (Kangasharju & Nikko, 2009; Straw et al., 1993; Straw et al., 1994).

Perhaps surprisingly from our current theoretical perspective, recent studies have shown a very weak correlation between job satisfaction and job performance (Judge, Thoresen, Bono, & Patton, 2001). This finding might, at first glance, suggest that emotions have little impact in the workplace and that the original advocates of scientific management were correct. However, it is important to remember that job satisfaction is a complex construct that is comprised of both affective (emotional) and cognitive (belief) components (Cranny, Smith, & Stone, 1992; Fisher, 2000; Locke, 1969). Psychologists are now deconstructing job satisfaction and exploring the relationship between the affective component and job performance. This new approach has started to reveal a positive relationship between positive affective state (mood) and job performance (Weiss, 2002).

In fact, numerous studies show tangible benefits that positive affect can bring to the workplace (Jundt & Hinsz, 2002; Straw et al., 1994; Straw & Barsade, 1993; Wright & Straw, 1999). For example Straw and Barsade (1993), demonstrated that MBA candidates with a higher positive affect, as measured by a self report scale, performed better on simulated managerial scenarios and were also rated by a panel of three experts as having greater managerial potential.

Furthermore, it also appears that the relationship between affect and performance is not related to experience or skill levels. For example, Estrada, Isen, & Young (1994) and Isen, Rosenzweig, & Young (1991) both show that the diagnostic ability of junior doctors (non-experts) is influenced by their mood state. Yet, perhaps surprisingly, when Estrada, Isen, & Young (1997) repeated the study with experienced doctors, they discovered the same effect; diagnoses are more accurate when doctors are in a positive mood regardless of their level of experience.

Based on such findings, psychologists argue that if employees are in a positive mood then organizational performance will be improved. However, this creates a number of difficulties for managers. Can managers induce a positive mood in their employees? In fact, within motivational psychology a participant's mood is frequently used as an independent variable (see, for example, Cinciripini et al., 2003; Forgas, 1998; George, 1989). As a result a number of highly successful mood induction techniques have been developed for use in a laboratory environment. In some mood-induction experiments, researchers induce a positive mood by asking participants to view a series of positive images (Yang, Beach, & Symonds, 2009). One set of images that is regularly used is the International Affective Picture System (IAPS) (Lang, Bradley, & Cuthbert, 1997). Although this is a technique developed for use in a highly controlled laboratory environment, it does resemble a practice that occurs in the 'real world'. Specifically, over the past 20 years so-called motivational posters have sprung up in workplaces around the world. Usually featuring a glorious landscape photo on a black background, motivational posters extol some corporate value – e.g., “teamwork” or “success”— and provide a definition or an inspiring quotation. In fact, the majority of the images that feature on motivational posters closely resemble the positive images from the IAPS database. Thus, it is possible that exposure to positive images displayed on motivational posters, reinforced by the positive textual messages, might have a positive impact on employee mood which might then impact on job performance, productivity, and satisfaction. If the positive psychology literature is accurate then one would hypothesize that if motivational posters can increase employee mood, then this improvement in mood (affect) should increase productivity.

**Do motivational posters work?**

Despite motivational posters having been around for over 20 years, the question as to whether they work has been unexplored by academics. Several scholars have referred to the posters in passing without actually conducting any research. For example, DeMarco and Listo (1999) suggest that the use of posters is a symptom of lazy management, with managers often using them as a ‘quick fix’ solution without treating the underlying organizational problems. Brown (2009) agrees that, on their own, posters are unlikely to produce any behavioral change, but if used as part of a wider coordinated organizational strategy, they could potentially influence employees.

In the current paper, we set out to address this gap by investigating whether motivational posters can influence employee performance. Although researchers have not yet quantified whether motivational posters have any effect on performance, it can be speculated that these posters are intended to function by subtly communicating office philosophies to employees. Each poster extols a virtue that managers believe is important for employees to possess. And, the hope is that repeated exposures to the posters should increase the likelihood that employees will exhibit these traits themselves.

Previous studies have demonstrated related effects whereby posters can impact behavior. For example, research by Mutrie and Blamey (2000) showed that exposure to a poster extolling the health benefits of climbing the stairs actually led to increased stair use. Although a promising indication, the signs used in these studies were fundamentally different from typical motivational posters used in the workplace. Firstly, in Mutrie and Blamey’s study (2000) the poster was placed at the foot of the stairs, at the moment individuals were forced to make a decision (to use the escalator

or stairs). And, in such a context, rather than seeking to motivate people to use the stairs, the poster acts as a prompt; reminding people of information that they already knew. This is quite different from the more general ‘ambient’ use of motivational posters within the workplace where exposure to the posters is typically quite removed from the time and place where critical actions are taken. Additionally, these past studies have employed posters that advocate very specific and well-defined actions. For example, compare the specificity of the message “for health benefits – take the stairs” to the vagueness of a message like “inspire – dare to lead”. In short, we believe that the vagueness of messaging combined with the distance (in space and time) between the poster and the desired action(s) make it a challenge to find support for the efficacy of motivational posters.

Despite the lack of direct evidence of the efficacy of such posters, other lines of research from the domain of social psychology suggests that the mere exposure to motivational posters may be sufficient to change performance through other mechanisms. For example, Bornstein and D’Agostino’s (1992) research shows that repeated exposure to a neutral stimulus produces an enhanced liking for this stimulus. In the context of motivational posters, such a ‘mere exposure effect’ (Zajonc, 1968) could cause an employee who is repeatedly exposed to a motivational poster (e.g. one advocating teamwork) to start viewing both the poster and the advocated concept in a more favorable way. If an employee begins viewing the concept in a favorable way, it is possible that they will start becoming a more efficient team player. This change in attitude is also likely to influence the way an employee perceives their job.

Perhaps the most intuitive hypothesis as to how motivational posters might have their impact runs as follows. When employees are exposed to posters emphasizing, for example, teamwork, they change the way they perceive their day-to-

day tasks at work. In other words, when framed within a teamwork context, rather than seeing their daily tasks as simply mundane and pointless, they begin to view their activities as serving an essential role for the team. Similarly, employees exposed to posters emphasizing dedication and perseverance are likely to believe that if they continue to do their best, even if it is on a mundane task, then they are likely to get promoted and eventually receive the appropriate rewards. If this general hypothesis is correct then motivational posters could be effective at improving employee performance, even if placed without a coordinated strategy.

### **Present research**

Despite the popularity of motivational posters, no empirical research has investigated the impact of motivational posters on employee performance. Furthermore, if these posters do have an effect on performance, the mechanism by which they affect performance is unclear. Due to the considerations outlined above, the authors speculate that if motivational posters are found to have a positive effect, then this could be due either to the motivational message of the poster (message effect) or to the mood induced by the poster (mood effect).

To determine the cause of any change in performance, participants in the present study were exposed to one of three sets of posters. Each set followed an identical format and layout: the entire background of the poster was black, a large full-color image was displayed in the top 80% of the poster, and some text (white font color) was included below the image. The first set of posters consisted of a range of motivational posters that were modeled on the popular variety but created in-house in order to better control the stimuli and to avoid copyright infringement. The second set consisted of parodic' posters. These posters parodied the traditional motivational posters, mimicking the style but carrying a humorous picture and an associated joke



(such posters are colloquial referred to as demotivational posters). As humor is a technique frequently used to induce a positive mood (Isen & Gorgoglione, 1983; Oaksford, Morris, Grainger, & Williams, 1996; Weisenberg, Raz, & Hener, 1998), it is likely that the humorous posters will increase positive affect, but without containing any work or motivating messages. The third (neutral) set of posters contains no motivational or parodic messages, but instead displayed neutral images and generic information.

H1 Exposure to motivational will improve participants' mood, performance and attitude than those exposed to neutral posters.

## **Method**

### **Participants**

A total of 62 undergraduate students, aged between 18 and 24, participated in the experiment, in exchange for printing and course credits. Participants were recruited using the departmental intranet and were informed that they were participating in a study investigating the impact of environmental cues on task performance. Participants were randomly assigned to one of three poster conditions. One participant withdrew from the research citing moral objections to the research.

Although 62 participants (21 participants in the motivational poster condition, 21 in the parodic condition, and 20 in the neutral condition.) may initially appear a small sample size, this sample size was determined by conducting an a priori power analysis. Using Cohen's (1988) power tables, this suggested that 20 participants per condition is a sufficient sample size in order to detect a medium effect size.

### **Materials and apparatus**

*Posters:* For the sake of better experimental control, the experimenters created all posters used in this study. All posters followed the traditional motivational poster design. All posters were created in PowerPoint using a slide template, with each poster measuring 720 by 540 (pixels). Each poster consisted of a black background with all text presented in white. The text included one large key text presented in all capitals in the screen center (font: Copperplate Gothic Bold, font size 40, bold) and a smaller quote supporting this theme below (font: Goudy Old Style, font size 24,

italics). The center of each poster consisted of a picture, with a white frame surrounding the picture (three pixels wide). Each of the three conditions contained twenty landscape posters.

**Condition 1.** This was the experimental condition, and the posters within it were all based on standard motivational posters. The posters were inspired by existing motivational posters commonly found in offices. Each poster promoted a different value, including: risk-taking, motivation, attitude, confidence, and perseverance. Relevant quotes to support each theme were selected from various online sources and relevant images were taken from Google Images. An example is included in appendix A.

**Condition 2.** All the posters in this condition were based on comic or “parodic” posters. These parodic posters were designed to entertain and amuse; and they were intended to enhance participants’ positive affect without providing any workplace-related message. All posters created for this condition mimicked existing parody posters. For better control (and to not offend or upset our participants), only non-offensive, humorous, posters were produced.

**Condition 3.** This was a neutral condition and the posters were based on the standard look and feel of motivational posters, but they contained no workplace performance message and were designed to have no influence on participant mood. Specifically, the images were selected from the IAPS image database (Lang et al., 1997). Only images with a neutral valence and low arousal level were selected. The texts accompanying each image had no mood induction properties. To achieve this, the principal text on each slide was the title of the photo from the IAPS database and the quote was a dictionary definition from the Apple inbuilt dictionary (Leopard

dashboard) e.g. “Camping – An outdoor recreation activity where individuals shelter under a canvas supported by poles or trees.”

**Appraisal of Posters.** After exposure to each poster the participant was asked to complete feedback about the poster. This information included rating the quality, motivating potential, and humorousness of each poster. This was included to monitor the quality of the posters, to ensure the parodic posters were perceived to be humorous and the motivational posters were perceived to be motivational.

**After-poster mood.** To assess if the posters had any influence on participant mood the Positive and Negative Affect Scale (PANAS) (Watson, Clark, & Tellegen, 1988) was administered. PANAS is now accepted as a reliable and standardized tool to measure mood (Crawford & Henry, 2004). The questionnaire itself lists twenty mood states, and participants rate how they feel, on a five-point scale, in relation to each state. Of the twenty items, ten measure an individual’s positive affect and the other ten measure negative affect. In this experiment, the PANAS scale was administered by computer, and all the mood-state adjectives were presented in a random order. A full copy of the PANAS scale can be found in Appendix D.

**Performance on a workplace task.** Anecdotal evidence indicates that motivational posters appear to be frequently used in organizations that utilize a low-commitment strategy, where such posters are a token gesture towards motivation. Consequently, our experimental task was designed to mimic tasks often found in such workplace environments. Taylor and Bain (1999) identified call centers as locations that meet these criteria. Although it was not possible to mimic the continual answering of the phone, it is possible to replicate the data inputting aspect of this job.

Using a data inputting task also enabled us to accurately measure productivity and accuracy over a short space of time in a controlled laboratory environment.

The data-inputting task lasted 30 minutes. This duration was selected based on pilot data that indicated thirty minutes to be sufficient time to see variability in performance and levels of engagement (e.g., boredom). Participants were presented with a printout of 300 records and asked to type as much data as possible into an Excel spreadsheet. Each record contained information for a fictitious individual including: ID value, title, first name, surname, address, postcode, and age. The participants were told to work as quickly and as accurately as possible. (See Appendix E)

Of the 300 forenames, 200 of the names consisted of the most popular boys and girls names in England and Wales for 2009 (Department of National Statistics, 2010). To increase the variability of the data, and increase mistakes, the final 100 forenames were chosen to be intentionally unfamiliar and more complex to spell. Forty of these unfamiliar names were the most popular German names, forty were traditional Welsh names, and the final twenty were minor and rarely mentioned characters from the Harry Potter books. Surnames used in the study were selected using an identical method as described above. The addresses were selected from an online database (Fakenamegenerator.com, 2011) to ensure that the first line, second line and the postcode all matched. It was important that the addresses were evenly distributed throughout the UK, so that no participant would have an unfair advantage being familiar with place names in his or her home area.

Participants entered this printed information into a customized form designed using Visual Basic within Excel (see Appendix F for a screenshot of this screen).

Each element of the record had to be inputted into a separate field. Participants were able to tab between fields. In the top left of the screen a clock indicated the time remaining.

**Data inputting task reflection.** Six self-report measures were included in which participants were asked to rate the data-inputting task in terms of how difficult, enjoyable, intrinsically rewarding, dull, pointless, and demoralizing they found it to be. Participants were asked about these various dimensions because it seemed likely that exposure to motivational or mood-altering messages could influence the way individuals might reflect on this task.

### **Procedure**

Participants arrived at the experiment and were taken to a small briefing room where the procedures were explained to them and consent was obtained. Participants were then taken through to the testing laboratory, where they sat at one of three identical workstations (separated by partitions, see Appendix G & H). Once seated at the computer, participants were exposed to 20 posters. These posters were motivational, parodic, or neutral, depending on the condition to which they were randomly assigned. Participants were shown each poster one at a time (in a random order) and asked to give a rating to each poster (self-paced) before the next poster appeared. This randomized, self-paced rating of all the posters was repeated three times. The first time, participants rated the quality of each poster on a five-point scale. On the second exposure (block) participants rated the posters on humor. And, in the final exposure, participants rated posters on their ability to motivate. To determine if the posters had a mood induction effect, the PANAS scale was administered after participants were exposed to the posters. Participants were then asked to complete the

data entry task, followed by completing the reflection on the data-inputting task. The total duration of the experiment was approximately 45 minutes.

### **Data analysis**

Data were then analyzed using one-way ANOVAs and Tukey post-hoc tests within SPSS V. 17.0.

## Results

### Appraisal of posters

A one-way, between-subject ANOVA found no significant difference in the reported quality of the posters,  $F(2,58) = 0.77, p = .47$ . However, a one-way ANOVA did reveal a significant difference with how humorous participants rated the posters,  $F(2,58) = 16.99, p = 0.00$ . A Tukey post-hoc analysis demonstrated that participants rated the parodic posters ( $M = 3.20, SD = 0.63$ ) significantly more humorous than both the motivational posters ( $M = 2.01, SD = 0.85$ ) and the neutral posters ( $M = 2.10, SD = 0.79$ ). A significant difference was also found between how motivating participants found the posters,  $F(2,58) = 5.36, p = .00$ . A Tukey post-hoc analysis demonstrated that participants rated the motivational posters ( $M = 3.44, SD 0.41$ ) as significantly more motivating than neutral posters ( $M = 2.80, SD 0.62$ ). However there was no significant difference between the motivational posters and the parodic posters ( $M = 3.09, SD 0.77$ ) at the  $p < .05$  level.

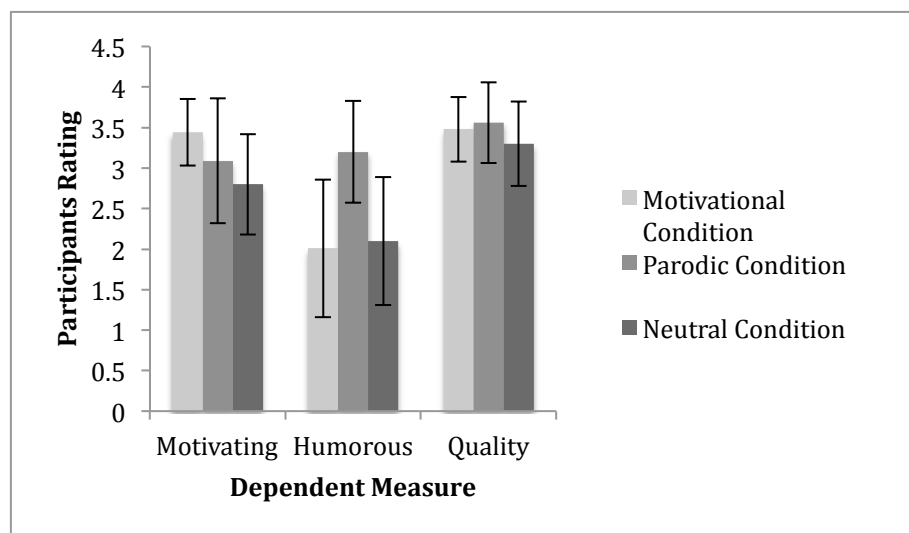


Figure 2: Participants perception of the posters used in the experiment by condition. Error bars are based on standard deviations of the means. Analysis indicated that participants perceived the motivating posters to be significantly more motivating and the parodic posters were significantly more humorous. There was no significant difference in the perceived quality of the posters.



Table 1: Participants performance after exposure to posters

	<b>Motivational</b>		<b>Parodic</b>		<b>Neutral</b>		<i>F</i> (2,58)	<i>p</i>	$\eta^2$
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
	Appraisal of posters								
Motivating	3.44 <sup>a</sup>	0.41	3.09	0.77	2.80 <sup>a</sup>	0.62	5.36	0.00	0.16
Humorous	2.01 <sup>b</sup>	0.85	3.20 <sup>bc</sup>	0.63	2.10 <sup>c</sup>	0.79	16.99	0.00	0.37
Quality	3.48	0.40	3.56	0.50	3.3	0.52	0.77	0.47	0.02
	After-poster mood								
Positive Affect	32.40 <sup>a</sup>	4.98	30.65	9.09	26.10 <sup>a</sup>	6.94	4.07	0.02	0.13
Negative Affect	14.40	5.72	16.05	8.87	14.00	4.22	0.55	0.58	0.02
	Task performance								
Records attempted	31.00 <sup>b</sup>	10.96	39.40 <sup>b</sup>	8.37	35.10	8.81	4.08	0.02	0.12
Accuracy (%)	84.32	13.62	85.18	5.62	86.68	7.63	0.31	0.73	0.01
	Reflection on data inputting task								
Difficult	2.07	0.96	1.95	0.78	1.95	0.69	0.12	0.89	0.00
Enjoyable	1.53	0.64	1.42	0.51	1.50	0.69	0.15	0.32	0.00
Intrinsically rewarding	1.60	0.74	1.47	0.61	1.60	0.60	0.24	0.79	0.00
Dull	3.73	0.59	4.11	0.74	3.85	0.67	1.39	0.26	0.05
Pointless	3.93 <sup>bd</sup>	0.80	2.79 <sup>b</sup>	0.79	3.10 <sup>d</sup>	0.85	8.61	0.01	0.25
Demoralising	4.07 <sup>ab</sup>	0.70	2.84 <sup>b</sup>	0.83	3.10 <sup>a</sup>	0.97	9.30	0.00	0.27

Note: Means in a row sharing a subscript are significantly different from each other at the .05 level.

### **After-poster mood**

An ANOVA suggested an overall effect of poster type on positive affect,  $F(2,58) = 4.07, p = 0.02$ . A Tukey HSD post-hoc analysis revealed that exposure to the motivational posters ( $M = 32.40, SD = 4.98$ ) led to significantly higher positive affect (PA) scores than exposure to the neutral posters ( $M = 26.10, SD = 6.94$ ). Comparisons between the parodic posters ( $M = 30.65, SD = 9.09$ ) and the other groups were not significant at the 0.05 level. This leads us to accept H1a, as exposure to motivational posters significantly increased participants PA score. However, we must reject H1b as there is no statistical difference between the parodic posters and the control posters.

Although the above tests revealed a significant difference in participants' positive affect, a one-way ANOVA revealed no statistically significant differences between participants' negative affect scores after exposure to posters,  $F(2,58) = 0.55, p = 0.58$ .

### **Task performance**

A one-way ANOVA revealed a significant effect of poster-exposure on overall task performance (in terms of records attempted),  $F(2,58) = 4.08, p = 0.02$ . A Tukey post-hoc analysis demonstrated that performance was better in the parodic posters condition ( $M = 39.40, SD = 8.37$ ) than in the motivational posters condition. There was no significant difference between the neutral condition and the other groups, at the 0.05 level.

This better productivity does not appear to come at the expense of task accuracy. As a one-way ANOVA showed, there were no significant differences in the percent of records accurately completed between groups,  $F(2,58) = 0.31, p = 0.73$ .

This leads us to reject H2a, as exposure to motivational posters failed to significantly improve participants' performance on the data-inputting task. However, we can accept H2b as participants exposed to the parodic posters performed statistically better than those who were exposed to the neutral posters.

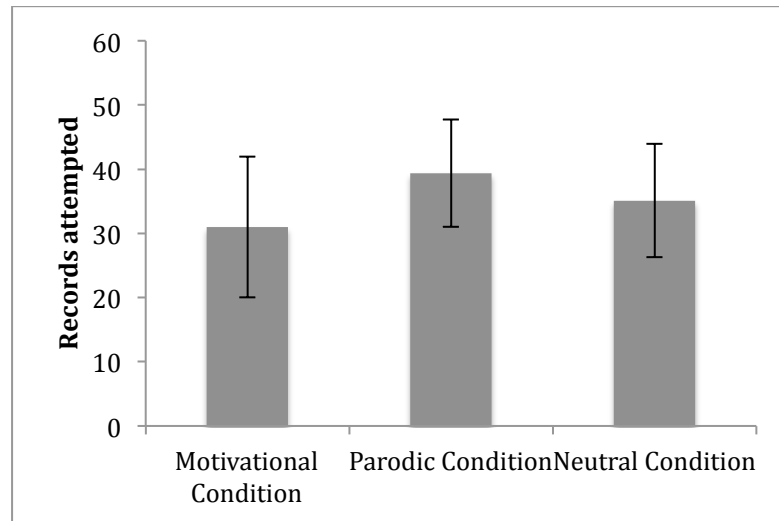


Figure 3: The average number of records completed by condition. Error bars are based on standard deviations of the means. Analysis indicated that participants in the parodic condition attempted significantly more records than participants in the motivational condition. There was no significant difference between participants' performance in the neutral condition and participants in either the parodic or motivational condition.

### Reflection on data inputting task

Being exposed to a poster not only influenced participants' performance on a task, it also changed the way participants reflected on the task. A one-way ANOVA (see Table 1) revealed that exposure to the different posters led to no significant differences between the groups in how they perceived the task in terms of difficulty,  $F(2,58) = 0.12, p = 0.89$ , intrinsic reward,  $F(2,58) = 0.24, p = 0.79$ , dullness,  $F(2,58) = 1.39, p = 0.26$ , or enjoyability  $F(2,58) = 0.15, p = 0.32$ .

However, participants exposed to motivational posters reflected on the task as significantly more pointless than participants in both the neutral group and the parodic posters condition.

Similar results were also found for how demoralizing  $F(2,58) = 9.30, p = 0.00$  as participants exposed to the motivational posters ( $M = 4.07, SD = 0.70$ ) rated the task as significantly more demoralizing than those who viewed either parodic ( $M = 2.84, SD = 0.83$ ) or neutral posters ( $M = 3.10, SD = 0.97$ ). This leads us to reject H3a: Exposure to motivational posters does *not* cause participants to reflect more favorably on the task. We accept H3b as there was no significant between the parodic condition and the control condition.

## Discussion

The results from this experiment suggest that motivational posters, if used alone, are unable to positively influence employee performance. Surprisingly, participants exposed to the motivational posters actually performed worse than those who viewed the parodic posters. In fact, not only did they perform worse (in terms of number of records entered), they also found the task more pointless and demoralizing. These results are important in terms of expectancy-based models of motivation (e.g. Vroom (1964); Porter and Lawler (1968)). It is worth noting that the effect size for the number of records attempted is 0.12, which using Cohen's (1988) criteria is a small effect size. Although not a large effect, the cumulative effect of such an impact could become considerable over time. This is because, if participants are continually exposed to motivational posters, then this will have a detrimental impact on performance each day. On a daily basis such a change in productive could almost be overlooked, however the cumulative effect of such a small change in performance will multiply over the course of a year.

However, it is important to note that this difference in performance could not be attributed to differences in the perceived quality of the posters between conditions. A one-way ANOVA revealed that all posters were rated of being of equal quality and therefore any difference must be attributed to the content of the poster.

As anticipated, exposure to motivational posters caused an increase in participants' positive affect, although there was no significant difference between the neutral condition and parodic posters. In retrospect it is unsurprising that motivational posters increased participants' PA, more than the parodic posters. The

motivational posters provided participants with a positive image reinforced with an inspiring message. Contrast this to the parodic posters, which, although using humor (frequently used in mood induction experiments), were poking fun at the futility of life and reinforcing the message that if we try harder, we do not always succeed. For this reason the parodic posters may not have triggered the elevation in mood that the experimenters were initially expecting.

However, despite motivational posters increasing PA scores, there was no corresponding increase in task performance. This is in contradiction to previous research that has suggested a positive impact of PA on task performance. In fact, unexpectedly, we found that exposure to motivational posters caused a negative impact on task performance; participants performed significantly worse in comparison to those exposed to the parodic posters. Positive psychology does not explain this behavior and so another explanation is required.

The most likely explanation for this impact of motivational posters on behavior can be attributed to the incongruence participants experienced between the explicit message contained on the motivational posters and the implied message from the task. When participants are exposed to the motivational posters they are primed to believe that they can achieve anything. The messages on the posters are likely to set participants' expectations for the subsequent task. As they highlighted the importance of leadership, dedication, and ambition, participants may have expected a task in which they would be given the opportunity to demonstrate such skills. However, when participants were then presented with the actual task, it was one to which they are clearly overqualified and which provided no opportunity for creative thinking or managerial skills. This may well have lead participants to feel demoralized and therefore experience limited or no task satisfaction as they believed that they were

viewed as not being capable or important enough to complete a task requiring intelligence and high cognitive abilities.

Contrast this with participants who had been exposed to the parodic or neutral posters. They will have received no indication as to how they might want to conceptualize performance in a team or on a task. Consequently, when they are asked to complete the data-inputting task, they are not unduly disappointed. This interpretation of the data is supported by the participant reflections on the data-inputting task. Participants exposed to the motivational posters reported finding the task significantly more pointless and demoralizing than those who were exposed to either the parodic or neutral posters.

We speculate that the measured decrease in performance could result from a form of reactance (Brehm, 1966) to the content of the motivational posters. Reactance theory states that when an individual perceives his or her behavioral freedom as being threatened or restricted, then they experience an internal emotional response that leads one to contradict the rules in an attempt to reinstate their perceived sense of freedom. The degree to which an individual experiences reactance will depend upon the individual and upon the importance and magnitude they assign to the freedom that is restricted. Reactance theory has been used to explain the failure of customer loyalty programs (Wendlandt & Schrader, 2007), workplace deviance (Lawrence & Robinson, 2007), and desiring the unattainable (Wright, Wadley, Danner, & Phillips, 1992). Reactance could be a mechanism that came into play in this study. Specifically, if our participants were not given the opportunity to make independent decisions, then this is likely to cause frustration, which Lawrence and Robinson (2007) suggest is frequently expressed as reactance. Although frustration was not measured directly in this study, one might hypothesize that the high ratings of

“pointless” and “demoralizing” expressed by participants exposed to motivational posters is likely to lead to feelings of frustration. However, although a possible mechanism, as it was not anticipated that motivational posters may decrease performance, no measures of reactance were included in the experimental design. Future studies might wish to consider including such measures to gain a better understanding of the psychological mechanisms at play in such uses of workplace motivation techniques.

The authors acknowledge that the relative decrease in participant’s performance on the data-inputting task could have been magnified by the experimental method we employed. Specifically, in our experiment, participants viewed 20 different posters in rapid succession while being forced to actively engage with each poster (by being asked to rate it on several dimensions). Immediately after, the psychological (PANAS) and behavioral (data-entry) measures were taken. However, in a workplace situation, employees are unlikely to see more than a few motivational posters a day and if they do, they are unlikely to pay much attention to them. Notwithstanding this, the principle investigated is still relevant in a corporate environment. This study investigated the impact of motivational posters on task performance, but it seems conceivable that the same types of reactance-based effect could occur with other types of stimuli. For example, the same incongruence could be experienced when a manager constantly informs employees that they are important and a valuable asset to the organization, but then asks them to complete a menial task. It seems likely that employees might respond in the same way we found; namely, they might (perhaps even subconsciously) decrease their overall output activity.

The present research adds to the literature demonstrating that there is no ‘quick fix’ to motivate employees, and managers must understand how each



employee perceives his or her job and goals. In virtually all theories of motivation, whether from a process (e.g. Equity theory, Adam 1963; Expectancy theory, Vroom 1964) or content perspective (Existence, Relatedness and Growth, Alderfer 1972; Maslow's Hierarchy of Needs, Maslow 1943) managers need to understand the employee in order to effectively motivate them. For example, in both Maslow's Hierarchy of Needs and Adam's Equity Theory, a manager is required to understand how the employee perceives their current situation. For example, in Maslow's case, which needs does the employee think have been satisfied and which remain unfulfilled. Once a manager knows this, they can correctly identify how to motivate their staff.

A similar process occurs for process theories of motivation. For example, according to Adam's Equity Theory an employee will work hard assuming that they perceive that they receive a fair reward for the amount of effort that they put in (Adams, 1963). If an employee perceives that they are not receiving a fair reward for their effort they will become demotivated. Consequently, for a manager to change the situation it is imperative that they understand the how the employee perceives the situation.

In our experiment, we just showed generic motivational posters without conducting any prior research to understand any issues that the participants may have been experiencing during the task. As a result it should not be a surprise that generic posters, that did not target individual participant's goals or drives, are incapable of having a motivating effect.

To conclude, no evidence was found to support the use of motivational posters as a technique to improve employee performance. However, the surprising result was

that the ill-conceived use of motivational posters not only failed to motivate employees but actually adversely impacted performance. Despite this, the authors would not advise against the use of motivational posters in all situations. If there is congruence between the messages the poster promotes and the messages employees receive from other workplace cues (e.g. their specific task demands) there is no reason why they would harm performance. In such a situation where posters and other (even perhaps implicit) workplace messages are congruent, it is conceivable that productivity could be increased. If this were the case, then the posters could be conceived of as part of a wider, coordinated strategy that positively influences employee behavior, as Brown (2009) predicted.

By exposing employees to the same message from a variety of sources, employees are more likely to learn the message (Zajonc, 1968). However, if the use of posters (or any other messaging) is not part of a coordinated strategy, and managers have displayed the posters without adjusting workplace procedures, it is highly improbable that they would have any positive influence on employees. More worryingly from a manager's perspective, if there is an incongruence between the posters' message and other workplace cues, it seems more likely that they will impair performance; as shown in this study.

Our research serves as a potent reminder to employers: Do not mislead employees about opportunities available in the workplace, even if it's just in the form of a poster encouraging workers to "aim high." This study suggests that if employees are encouraged to seek enrichment, but only offered demeaning tasks, this conflict can result in a decrease in performance.

### **3. The Effect of Exposure To Motivational Posters on Challenging Task Performance**

#### **Introduction**

Our previous research suggests that participants exposed to motivational posters before completing a data inputting task perform significantly worse than participants who are exposed to parodic posters (sometimes referred to as demotivational posters). It is hypothesized that this occurs as the motivational posters trigger reactance amongst participants. Reactance theory was first proposed by Brehm (1966) who suggested that an individual experiences reactance when their ability to choose how to act is restricted.

In the previous study it was proposed that participants in the motivational condition experienced reactance because they were shown posters that built up their self worth and motivation. However, there was incongruence between this message and the implied message from the data-inputting task. Participants were given no autonomy over the way they were to complete the data-inputting task and were restricted to following a prescribed procedure. Participants could have interpreted this as suggesting that they were not deemed either skilled enough or trusted to complete a more challenging task. Consequently, this led participants to experience reactance.

If this assumption is correct, replacing the data-inputting task with a more challenging task should decrease reactance and therefore there should be no difference in performance between participants who are exposed to motivational posters and those exposed to parodic posters. This is because there would be a

congruency between the messages of the motivational posters and the implied message from the task.

This leads us to the following hypothesis:

**H1** Exposure to motivational posters will not cause any difference in task performance on a challenging task than exposure to either parodic or neutral posters.

## Method

### Participants

A total of 63 undergraduate students, (34 female) aged between 18 and 27 ( $M = 20.8$ ,  $SD = 1.7$ ), participated in the experiment in exchange for partial course credits. All participants were recruited via an advertisement placed on the departmental intranet. Participants were randomly assigned to one of three poster conditions resulting in 21 participants in each condition.<sup>1</sup>

### Materials and Apparatus

*Posters:* In order to be able to compare the results of the previous study with this new study, the same posters were used. Condition 1 comprised of 20 motivational posters (inspiring images with a message promoting workplace relevant values (e.g. risk-taking, motivation, confidence and perseverance). An example motivational poster is included in Appendix A. Condition 2 comprised of 20 comic or "parodic" posters (colloquially referred to as demotivational posters). These are humorous posters, which although mimic the style of motivational posters, they contain no workplace-related content. Again each poster contained a humorous image accompanied by a relevant joke. An example parodic poster is included in Appendix

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<sup>1</sup> Unfortunately due to a computer error two participants PANAS scores were not recorded. Because of the encoding problem, for the PANAS scale the number of participants in each condition was: Motivational Posters = 20, Parodic Posters = 21 and neutral = 20.

B. The third condition acted as a control condition. Again all of the posters mimicked the style of the traditional motivational posters but the images used were rated as being low arousing and having a neutral valence. In order to achieve this all of the images were selected from the IAPS database (Lang et al., 1997) with the text supporting each image being the dictionary definition of the image, for example “Pattern: a repeated decorative design”. An example control poster is included in Appendix C.

*Appraisal of Posters:* Once again participants were asked to rate the posters in terms of quality, motivating potential, and humor of each poster. These questions were included to ensure the posters in all conditions were of equal production quality and to ensure the motivational posters were rated as significantly more motivating than the posters in the other conditions.

*After-poster mood:* In order to determine if the motivational posters had any mood induction properties (as was the case in our initial experiment) participants mood was recorded using the Positive and Negative Affect Scale (PANAS) (Watson et al., 1988). Participants were presented with 20 mood related adjectives and asked to answer ‘to what extent you currently feel that emotion now’. Participants responded on a five point scale ranging from very slightly (1) to extremely (5). The PANAS questionnaire was administered electronically with the questions being presented in a random order. A complete list of questions asked in the PANAS questionnaire is included in Appendix D.

*Performance on an intrinsically rewarding task:* Previous research has demonstrated that most participants find completing puzzles intrinsically rewarding and interesting (Fisher, 1978). Yet while participants find puzzles in general

interesting, the degree to which an individual puzzle will interest a participant will depend on the puzzle type. In order to deal with this problem, participants were presented with two different forms of puzzles; a series of number-search tasks and a series of Sudoku puzzles. Sudoku puzzles were selected as Lewis (2007) claimed that Sudoku's have a broad appeal and are especially popular within the UK.

Rather than presenting participants with the standard Sudoku puzzles, participants were presented with 'mini Sudoku' puzzles. Unlike a traditional Sudoku puzzle, which comprises of a 9 by 9 matrix, these 'mini Sudoku' only consist of a 6 by 6 matrix (see example below). The mini Sudoku were selected as they are considerably easier than the larger puzzles and can be completed more quickly than the full version.

All of the puzzles selected were rated as easy and pilot testing (n=10) by experienced puzzlers confirmed they were all perceived as easy or very easy. Participants were instructed to try and complete as many puzzles as possible and if they were stuck on one puzzle they were to move onto the next one. Participants were given 15 minutes to solve as many puzzles as possible.

2					
	6	3		5	
3		5	6		
4			5	1	
			1	4	
6					

Figure 4. Example Sudoku puzzle

The second puzzle task was adapted from Mazar, Amir, and Ariely (2008) study. Participants were presented with a booklet containing 25 four-by-three matrices, with each cell containing a three-digit number (see example below).



169	182	291
467	481	305
582	506	428
636	519	457

Figure 5. Example matrix

Participants were asked to find two numbers in the matrix which sum to one thousand. Once they found these two numbers they were asked to circle the two numbers and then move onto the next task. This task was selected because Mater et al reported that participants did not believe the task reflected any maths skills or intelligence. (The authors recognize that a basic level of maths skill is required, but all participants in the study were students at university, and should have reached a minimum standard.) Students were given ten minutes and asked to complete as many matrixes as possible. The order of these two puzzles was randomized to prevent any order effects.

*Post Experiment Reflection:* Six self-report measures were included for participants to rate their experience of both puzzle tasks. Participants were asked to rate both puzzle tasks in terms of how: difficult, enjoyable, intrinsically rewarding, dull, pointless, and demoralizing they found the tasks. Participants rated each of these dimensions on a five-point scale ranging from ‘very slightly or not at all’ to ‘extremely’. These questions were asked in order to identify if the motivational content of the posters influenced the way participants perceived the task.

## **Procedure**

A similar procedure to the previous experiment was utilized. Participants arrived at the experiment where the experimental procedures were outlined and consent was obtained. Participants were then taken into the main laboratory where they sat at an individual cubical, preventing them from seeing other participants. (See Appendix G & H). Participants were first exposed to the 20 posters; either motivational, parodic or neutral depending on the condition to which they were assigned. Participant were presented with each poster individually and asked to rate each poster for either it's quality, humor or motivation before the next one was presented. The participants were therefore exposed to each poster three times in order to rate each on all three dimensions. This task was self-paced and there was no time limit.

After exposure to the posters participants were required to complete the PANAS scale to detect if any of the posters had a mood induction effect. This was followed by the puzzle tasks with the order in which the two puzzle tasks were presented being counterbalanced. Participants were then asked to complete the "post experiment reflection" questionnaire before being thanked and fully debriefed. The final duration of the experiment was approximately 35-40 minutes.

## **Data analysis**

The data was then analyzed using a series of one-way ANOVAs with a Tukey post-hoc test conducted within SPSS V. 19.0.

## Results

*Manipulation check:* The posters used in the second experiment were identical to those from the first experiment but despite this, the same checks were made to ensure all posters were still of a similar quality level. A one-way ANOVA found no significant difference between the perceived quality of any of the posters  $F(2,60) = 3.25, p = 0.22$ . However, a significant difference was found for how motivating the posters were,  $F(2,60) = 3.25, p = 0.22, \eta^2 = 0.247$ . The motivational posters ( $M = 3.41, SE = 0.52$ ) were rated as significantly more motivating than the parodic ( $M = 3.00, SE = 0.07$ ) or neutral posters ( $M = 2.76, SE = 0.12$ ). A significant difference was also found for how humorous participants rated the posters  $F(2,60) = 12.10, p < 0.001, \eta^2 = 0.287$ . A Tukey HSD post-hoc test indicated that participants perceived the parodic posters ( $M = 3.14, SE = 0.49$ ) as significantly funnier than either the motivational ( $M = 2.24, SE = 0.77$ ) or neutral posters ( $M = 2.23, SE = 0.75$ ).

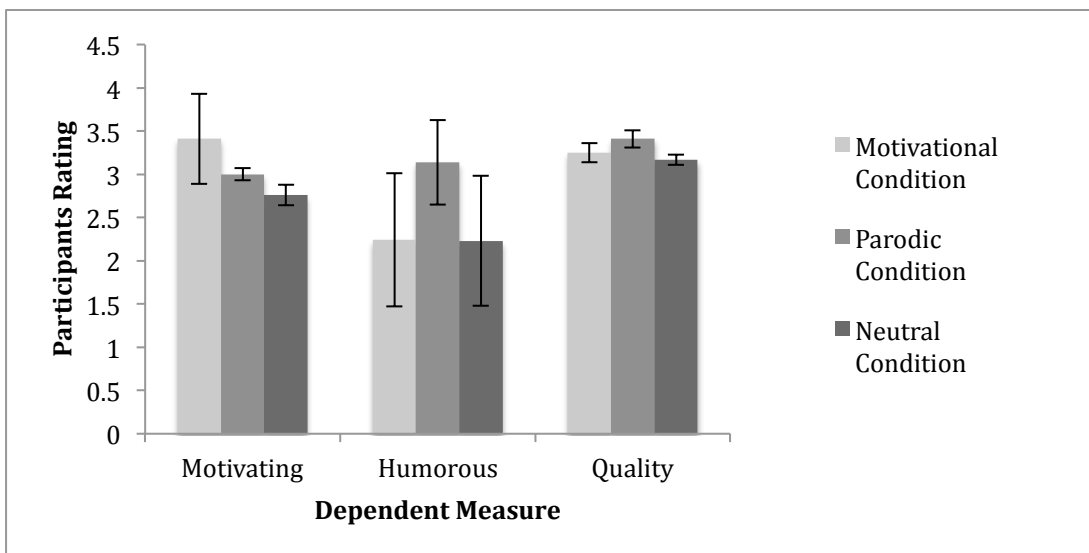


Figure 6: Participants perception of the posters used in the experiment by condition. Analysis indicated that participants perceived the motivating posters to be significantly more motivating and the parodic

posters were significantly more humorous. There was no significant difference in the perceived quality of the posters. Error bars are based on standard errors of the means

Table 2: Participants' performance across conditions

	<b>Motivational</b>		<b>Paradoxic</b>		<b>Neutral</b>		<i>df</i>	<i>F</i>	<i>p</i>	$\eta^2$
	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>				
	Appraisal of poster									
Motivating	3.41 <sup>ab</sup>	0.52	3.00 <sup>a</sup>	0.07	2.76 <sup>b</sup>	0.12	2,60	9.84	<0.001	0.247
Humorous	2.24 <sup>a</sup>	0.77	3.14 <sup>ac</sup>	0.49	2.23 <sup>c</sup>	0.75	2,60	12.10	<0.001	0.287
Quality	3.25	0.11	3.41	0.10	3.17	0.06	2,60	1.56	0.22	0.049
	Post poster affect									
Positive Affect	29.13	1.53	30.64	1.22	29.80	1.51	2,58	0.29	0.75	0.010
Negative Affect	16.60	1.70	14.48	0.97	14.50	0.89	2,58	0.97	0.39	0.032
Matrices Solved	13.00	1.37	13.38	1.23	10.14	1.58	2,60	1.60	0.21	0.051
Sudoku puzzles Solved	3.90	0.48	4.10	0.42	3.33	0.48	2,60	0.75	0.48	0.051
Sudoku number correct	97.29	9.51	106.29	9.17	92.86	10.31	2,60	0.50	0.61	0.016
	Puzzle task reflection									
Task is .....										
Difficult	3.00	0.95	3.33	0.14	2.90	0.23	2,60	1.32	0.28	0.042
Enjoyable	3.57	0.24	3.38	0.19	3.24	0.24	2,60	0.57	0.57	0.019
Intrinsically rewarding	3.48	0.21	3.39	0.25	3.10	0.29	2,60	0.73	0.49	0.024
Dull	1.9	0.17	1.71	0.16	1.67	0.19	2,60	0.54	0.58	0.018
Pointless	1.95	0.23	1.71	0.16	2.00	0.21	2,60	0.58	0.57	0.019
Demoralizing	1.38 <sup>a</sup>	0.74	1.95 <sup>ab</sup>	0.15	1.33 <sup>b</sup>	0.16	2,60	4.89	0.01	0.140

Note: Means in a row sharing a subscript are significantly different from each other at the .05 level.

*Mood Manipulation:* A one-way ANOVA revealed no significant effort difference between participants positive affect  $F ( 2,58) = 0.29, p = 0.75, \eta^2 = 0.01$ , or negative affect  $F ( 2,58) = 0.97, p = 0.39, \eta^2 = 0.032$  between any condition.

*Performance:* A one-way ANOVA showed that there was no significant difference between the number of matrices correctly solved  $F ( 2,60) = 1.60, p = 0.21, \eta^2 = 0.051$  between any condition (See Table 2). The Sudoku puzzles were also analyzed, and again this revealed no significant differences in the number of Sudoku puzzles solved  $F ( 2,60) = 0.75, p = 0.48, \eta^2 = 0.051$  and Sudoku numbers correctly identified  $F ( 2,60) = 0.50, p = 0.61, \eta^2 = 0.016$  between the conditions.

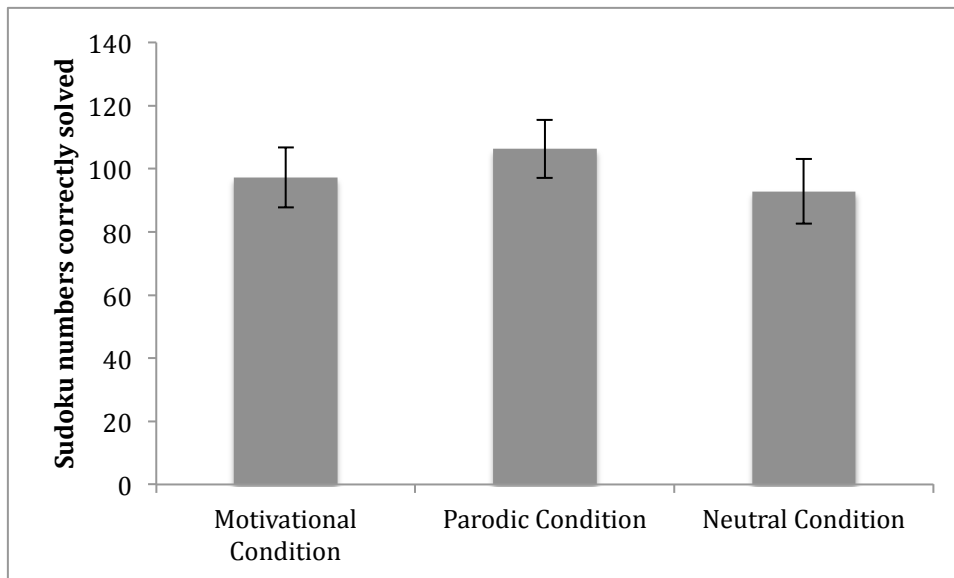


Figure 7: Number of Sudoku answers participants correctly solved by condition. Error bars are based on standard errors of the means Analysis indicated no statistical difference in participants performance regardless of what condition participants were assigned to.

*Post Experiment Reflection:* Table 2 displays the mean score for participants' reflections on the task. A one-way ANOVA revealed no significant difference at the  $p = 0.05$  level in how difficult,  $F(2,60) = 1.32, p = 0.28, \eta^2 = 0.042$ , enjoyable,  $F(2,60) = 0.57, p = 0.57, \eta^2 = 0.019$ , intrinsically rewarding,  $F(2,60) = 0.73, p = 0.49, \eta^2 = 0.024$ , dull  $F(2,60) = 0.54, p = 0.58, \eta^2 = 0.018$  or pointless,  $F(2,60) = 0.58, p = 0.57, \eta^2 = 0.019$  the experiment was. However, unlike the first experiment, a one-way ANOVA revealed a significant difference in how demoralizing,  $F(2,60) = 4.89, p = 0.01, \eta^2 = 0.140$  the task was. A Tukey post-hoc test revealed that participants in the parodic condition ( $M = 1.95, SE = 0.15$ ) found the task significantly demoralizing in comparison to the motivational condition ( $M = 1.38, SE = 0.74$ ). However, the neutral condition did not significantly differ from the motivational or parodic condition.

## Discussion

The results from this experiment suggest that there is no difference in participant performance on an intrinsically rewarding task between participants exposed to motivational posters, parodic posters, or control posters. While there was no difference on the actual task participants were asked to complete, there was a difference in the way they reflected on the task. Participants who were exposed to the parodic posters rated the task as significantly more demoralizing than those exposed to motivational posters or in the control condition.

Although the same independent variables were used in both experiments, a number of differences occurred which cannot be explained by the different dependent variables. Firstly, in the previous experiment, participants who were exposed to the motivational posters experienced an elevation in mood in comparison to participants in the control condition. However, in this experiment there was no significant difference in participant's mood between any conditions. A potential explanation for this finding could be attributed to when the two experiments were conducted. There was a significant delay (over 6 months) between data collection for the two experiments. Previous research has demonstrated that an individual's current mood state can easily be influenced by external variables (e.g. music, Martin, 1990) or watching television (Westermann, Spies, Stahl, & Hesse, 1996). A growing body of research suggests that the weather impacts individuals mood (Keller et al., 2005; Klimstra et al., 2011). Yet this relationship can also occur at a seasonal level (Okawa et al., 1996) and is now commonly referred to as Seasonal Affective Disorder (SAD) (Partonen & Lönnqvist, 1998). As the second experiment was conducted during the



winter months it is plausible that this decreased the likelihood of elevating participants positive affect levels to those found in the first experiment.

While we do not believe it to have affected results we identify that the power analysis was based on an estimation of effect size (Cohen, 1988). Unfortunately as no prior research has explored the impact of motivational posters, the effect size was only an estimation. Secondly, a power analysis is usually used to calculate the sample size needed to identify an effect, however it is possible that we may have achieved a type 1 error in our initial study. As people are so variable, it is possible to detect random results in what are theoretically adequate sample sizes.

Although the potential issue of the sample size could jeopardize the conclusions from this study, we do not believe this is likely to have affected the results. While we recognize that there will be individual differences in participant's skill and experience level at completing both Sudoku and the maths task, we do not believe this affected the results. This is because participants were randomly assigned to a condition, so if a group had an individual who was very strong at Sudoku, it is equally likely that they will have another individual who is weak, eradicating this effect. Support for this assumption is provided by the standard error, which is not particularly high on any of our measures.

In order to test if motivational posters can trigger reactance our dependent measure needs to be more intrinsically rewarding than the data inputting task used in the initial experiment. Participants perceived the puzzle tasks to be more enjoyable and intrinsically rewarding than the data inputting tasks, suggesting that there is not likely to be a conflict between the message of the motivational posters and the implied message from the task.

As no significant difference was found between participant's performances on the puzzle task, regardless of the posters they were exposed to, this supports our assertion that in the right circumstances motivational posters can trigger reactance. This conclusion is supported further as in the original experiment participants who were exposed to motivational posters found the task significantly more pointless and demoralizing than those who were exposed to parodic or control images, nevertheless in this second study no difference was found. Despite this, there was a significant difference in how demoralizing participants found the task. Participants exposed to the parodic task rated the puzzle task as significantly more demoralizing than those who were exposed to motivational posters.

Although a difference occurred we do not attribute this to reactance. This is for two reasons: Firstly, the parodic posters did not seek to build up participants self worth (in fact they did the opposite) resulting in no message for participants to react against. Secondly, if participants did experience reactance, then we would have expected a significant difference in performance on the actual task, (as a form of protest against the restriction in freedom) as well as the change in the self report measure.

We believe that this difference occurs because although the parodic posters did not convey any direct work related messages, there is an implied message. Originally parodic posters mocked traditional motivational posters by highlighting the futility of an employee's life. This was achieved by suggesting that no matter how hard an employee works, in reality it will not make any difference. While the parodic posters included in our study did not include such messages, they could have primed participants to think about the more traditional posters suggesting that trying to work hard is pointless. Consequently, when it came to reflecting on the task, participants

may be more inclined to think of the task as demoralizing as they feel their contribution does not count.

While both this and the previous study failed to find any evidence to support the use of motivational posters as a technique to improve performance, it is possible (although unlikely) that this could have occurred because of the diverse range of motivational posters used. If participants had only been shown motivational posters that advocated one attribute (e.g. risk taking) it is possible that this could cause participants to exhibit this trait more. This could have occurred because of two different mechanisms; the 'mere exposure effect' (Zajonc, 1968) which suggests that the more we are exposed to a message, the more we will like it; and priming, which is an implicit memory effect where exposure to an initial stimulus influences an individual's response to a subsequent stimulus. Exposure to a motivational poster advocating a workplace trait could prime individuals to behave in this manner.

Although priming been shown in numerous laboratory based studies (Blair & Banaji, 1996; Brasel & Gips, 2010; Harris, Bargh, & Brownell, 2009), in all of these cases participants were forced to actively engage with the prime, for example by completing a scrambled sentence task). However, new research suggests that participants do not need to actively engage with a prime for it to have an influence. For example, Berger, Meredith and Wheeler (2008) demonstrated that our surrounding environment is capable of priming our behavior. They analyzed the results of the 2001 Arizona general election and discovered that voters who were assigned to vote at a local school, were far more likely to support a school funding initiative than those who voted at another building (e.g. a church hall or a community center). They suggested that the mere act of being in a school, primed voters to think about the importance of education.

Yet despite this strong evidence, we still think priming is unlikely to occur. Priming is an implicit memory effect whereby exposure to a previous stimulus subsequently influences a participant's performance (Bargh, 2005). In a laboratory based study this is frequently achieved by asking participants to complete a task which is not connected to the main experimental task. For example completing a scrambled word task (Bargh, Chen & Burrows, 1996), stem sentence task (Chartrand, Huber, Shiv & Tanner, 2008) or even driving a car with branding on the outside. (Brasel & Gips, 2010). This task is designed to activate associate memories, so for example if a participant was presented with the words: old, grey and bingo; these words could prime thoughts of pensioners.

The reason why we do not believe priming occurred in this study is that for a prime to change behavior, participants should be unaware that the prime is designed to influence their behavior. Once participants understand what a prime is trying to achieve it loses its effectiveness (Lepore & Brown, 2002) although it still has a small effect. However, as motivational posters are overtly trying to change employee's behavior, it seems likely that this priming effect will be very weak if it does materialize at all. While no research has sought to establish if motivational posters have a priming effect, there is some similar research conducted within the advertising domain. Laran, Dalton, and Andrade (2011) investigated the priming effect of both brand logos and brand slogans. This is relevant because they suggested participants recognized that the brand slogans were a direct attempt to manipulate them into buying a particular product, whereas brand logos were just a means to distinguish between competing products.

Consequently, after exposing participants to brands related to spending money (premium brands), participants spent significantly more money than participants who

were exposed to brands associated with saving money; in effect a simple priming study. Yet, when the experimenter tried to prime participants by exposing them with the brand slogan and asked to evaluate the slogan in terms of its 'persuasion intent', all priming effect was lost. However, when they repeated the experiment but asked participants to evaluate the same slogan for how 'creative' it was, the priming effect returned. This is likely to occur because when participants evaluated just the brand name or the slogan but through the 'creative lens' they thought about what the brand stood for. On the other hand, when participants thought about the slogan through the 'persuasive lens' they perceived the organization was deliberately trying to manipulate them; as a result the priming effect was lost.

Consequently, as employees are aware that motivational posters are a direct attempt to change their behavior, it seems highly unlikely that these posters will have any priming effect.

### **Conclusion**

When participants completed an intrinsically rewarding task, after being exposed to motivational poster, there was no change in task performance. This provides further evidence to suggest that participants experienced reactance in our previous experiment. While initially sounding positive, this experiment failed to fully replicate our previous study. Despite using the same stimuli and recruiting participants from the same participant pool, the motivational posters failed to increase participant's mood, which our previous study predicted. Consequently further work is needed to replicate both studies before a fully informed conclusion can be reached.

## **Part C: Digital Signage as an Atmospheric Variable**

## 4. Nature in the Workplace

### Introduction

As European businesses attempt to survive the worst recession in living memory (Felstead, Green, & Jewson, 2011) businesses are forced to ensure they maximize their returns from all of their assets (Barney, 1991; Hirsch, 1995). Organization comprises of many different assets, however, one asset which is frequently overlooked by many managers and scholars is an organization's employees (Lank, 1997). Thankfully, various laws protect workers in the European Union from the working conditions some managers might be tempted to enforce. However, there are more subtle ways through which managers might be able to increase output.

Unlike machines, humans cannot work at the same consistent level of performance, all day, every day. In reality a range of external factors influence our performance (Chandrasekar, 2011; Uhrbrock, 1961). Some of the earliest management scholars concentrated on how physical environments directly impacted employee performance (e.g. Taylor, 1923 or F. B. Gilbreth & Gilbreth, 1917) yet over the last two-decades organizational psychologists have started to investigate how emotions influence employees performance (Straw et al., 1994; Wright & Straw, 1999). As a result employers need to understand how the work environment can influence an employee's mood and consequent performance.

One environmental variable, previously overlooked by management scholars, but which can have a direct impact on employee's mood, is the presence of windows. Employees who are required to work in conditions without access to a window are more likely to experience job dissatisfaction, depression, and tension (Sundstrom, 1981). Yet despite this research being published over two decades ago, a significant



number of employees still report that they are dissatisfied with the lack of windows within their corporate environment (Kaplan, 1993). To cope with the lack of external views, many employees try to compensate by hanging posters of natural scenes within their work environment (Sommer, 1974). It turns out that this is beneficial to both employees and employers: new research suggests that not only do employees like having access to nature and views, but also that exposure to nature can actually improve performance (Berman, Jonides, & Kaplan, 2008; R. Kaplan & Kaplan, 1989; Kaplan, 1995).

The leading theory to explain this performance improvement is Attention Restoration Theory (ART) (R. Kaplan & Kaplan, 1989). Kaplan et al. suggest that a range of factors are capable of negatively affecting human performance, but two key variables that have a considerable impact are mental fatigue and stress. While previous studies frequently use the terms interchangeably, Kaplan et al. define these as two very distinct concepts. Stress is an unpleasant emotional state that arises from an increase in arousal levels, for example being placed in a hazardous environment. This contrasts with mental fatigue which can often be characterized by tiredness, cognitive impairment, and a lack of motivation (Pkerstedt et al., 2004) caused when an employee is forced to direct their attention towards the same stimuli for a prolonged period of time.

Finding a viable long-term solution that can cure employees of mental fatigue is a challenge. In the short-term, employees could take temporary breaks, finish for the day, or, in more extreme cases, have a holiday. In many situations these are not viable solutions, as in most cases employees do not have the freedom to simply take a break when they are tired. Furthermore, such workarounds are definitely not long-term solution to the problem of mental fatigue. When the employee returns to the

task, it is highly probable that they will experience mental fatigue again. However, Kaplan believes that by exposing employees to nature, it is possible to reduce their mental fatigue. What he referred to as Attention Restoration Theory (ART). Kaplan suggests that the fact employees like to expose themselves to nature indicates that they subconsciously realize that nature is beneficial to their performance, although they may not understand why. When employees are exposed to nature, it allows them to have a break from their primary task.

Although a formal break would also provide the same benefit, being exposed to nature is more successful for a number of reasons. Firstly, nature is capable of effortlessly attracting attention. But unlike taking a break, it may be possible for an employee to be exposed to nature while continuing with their primary task. Secondly, being exposed to nature affects us differently to other environments.

This is because while most other stimuli compete for our cognitive resources (and consequently induce mental fatigue), natural environments are capable of capturing attention without inducing mental fatigue (R. Kaplan & Kaplan, 1989). The end result is that nature is capable of reducing mental fatigue, providing a break from our primary task and acting as an opportunity for our directed-attention mechanisms to get a chance to replenish (Kaplan, 1995).

Although actual research supporting the mechanism by which nature improves employee's performance is limited, a growing body of literature supports the concept that exposure to nature can have a range of benefits. For example, studies show that such exposure can improve an individual's performance (Berman et al., 2008; Chandrasekar, 2011; Wells, 2000) and facilitate an individual's attention and memory (Berto, 2005; Ottosson & Grahn, 2005). But while this is an interesting academic finding, identifying a way to implement this in a workplace setting can be

challenging. Unfortunately for ART, the majority of businesses are located in built up urban areas, providing employees with limited opportunities to immerse themselves in nature. This raises a number of interesting questions for businesses along the lines of: is there a way for a business to artificially recreate the experience of nature in an urban environment?

Shibata and Suzuki (2002) explored one option for recreating scenes of nature: placing leafy plants in an office environment. While they found that the plants had no impact on employees' mood, they discovered that the presence of leafy plants improved task performance, with male employees benefiting more from the plants. However, while they attempted to prove that plants could have a positive mood induction effect, this result could be attributed to an error with the method used. Specifically, the duration of the study was only 25 minutes. Over the course of the study participant's mood continued to deteriorate. By the end of the experiment, there was no significant difference between participants mood in either condition. However, if the duration of the experiment was significantly longer (which would resemble a typical working day), participant's mood would continue to deteriorate and it is possible that a 'protecting' effect of plants could have been found

Yet while keeping plants in the office may be a viable option for some employees, this option may not be feasible for others. Consequently, an alternative needs to be considered, including exposing employees to artificial or simulated images of nature. Although participants who are exposed to simulated scenes of nature, do not actually experience 'real' nature, research suggests that exposure to simulated scenes can lower a participant's stress levels more than exposure to urban scenes (Parsons, Tassinary, Ulrich, Hebl, & Grossman-Alexander, 1998). Unfortunately, the results of these experiments still have limited application for

businesses because in these experiments participants were required to actively engage with the simulated scenes. Rather than being passively exposed to the images, participants were asked to complete a driving simulation task in either an urban or rural location. Of course, in most employment situations, it is not practical (or economical) for employees to fully engage in a task just to immerse themselves in nature.

To tackle this problem, Friedman, Freier, Kahn, Lin and Sodeman, (2008) conducted an experiment where they passively exposed participants to nature scenes. In offices without windows, they installed an HDTV so that it reassembled a window, displaying real time images of the immediate scene outside (just like a window). Friedman et al. reported that by creating such an artificial window, employees reported feeling an improvement in psychological wellbeing and an improvement in cognitive function. However, these data were collected from a very limited sample size ( $n=7$ ) and the data were collected using a qualitative data collection technique rather than a controlled experiment. When a similar experiment attempted to replicate this by using a more robust quantitative method and a larger sample size ( $n=90$ ), they failed to detect an effect. In this version of the experiment participants were randomly assigned to one of three conditions: a room with a view looking over a natural scene, a room with no window but an HDTV displaying an identical view to the window in condition 1, and a window looking out over a brick wall. Participants were brought into one of the three rooms and were left before completing a series of tasks. The results indicated that while the window overlooking scenes of nature had a restorative effect in comparison with the other two conditions, there was no difference between performance of participants who were exposed to the HDTV screen or the images of nature or the view of the blank wall.

Despite this negative result, it is worth noting that in this experiment they concentrated on participant's physiological state and not actual performance, which would interest a business. Other studies which have focused on participants physical performance have revealed that participants who are exposed to computer images of nature, perform significantly better than those who are exposed to urban scenes (Berman et al., 2008; Sommer, 1974). While this is a positive result, this study is still not a viable solution for a workplace as participants were still 'forced' to view images of nature before completing the task. To date, no study has investigated the impact of voluntary or passive exposure to simulated scenes of nature in a workplace environment, focusing on both psychological and performance measures.

### **Present research**

Despite the positive work suggesting that the presence of nature can improve an employee's task performance, businesses are sometimes unable to naturally expose employees to nature because they are located in urban areas or are in built up spaces that lack sufficient windows. Consequently, we want to establish if participants who are passively exposed to digital scenes of nature while completing a simulated work task, will experience an improvement in performance as predicted by ART. This leads us onto the following hypotheses:

- H1 Individuals who experience passive exposure to images of nature via a digital sign network (DSN) will have greater positive affect, perform better and report lower levels of burnout than those exposed to urban scenes or no images.

## Method

### Participants

A total of 62 undergraduate students, aged between 18 and 31 (male = 30,  $m = 25.6$   $SD = 3.83$ ) participated in the experiment, in exchange for printer credits<sup>2</sup>.

Participants were recruited using a combination of the departmental intranet and a convenience sample. All participants were informed that they were participating in a study investigating the impact of environmental cues on task performance. However, the specific nature of the task was intentionally left vague. Participants were randomly assigned to one of three DSN conditions; nature, urban, or control (DSN installed but screen turned off)

### Materials and apparatus

*Apparatus:* Materials used in this experiment consisted of a 32" digital sign (NEC MultiSync 3120, controlled by a standard PC), mounted in the center of a laboratory testing room (See Appendix I). The screen replicated DSNs that are located in other public and teaching spaces around the university.

Participants entered all information via a standard PC (Enterprise International) with a Samsung SyncMaster 997MB. Participants entered their responses into the computer by using a combination of keyboard and mouse response.

### Content Loop

Participants were assigned to one of three conditions; control, nature, and urban. In the control condition the DSN was installed but was not switched on.

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<sup>2</sup> Of the 62 participants who started the study, two participants were excluded from the final analysis because they did not fully engage in the experiment.

The content loop for both the nature and urban condition consisted of 25 images. Each image was displayed on screen for 6500ms before dissolving into the next image. All images used in this experiment were presented in a landscape orientation (matching the screens orientation) and were of high resolution (1024\*768). The images used in this study were selected using a pilot study (n=20). Experimenters initially downloaded, 60 images which they believed represented an urban scene (For an example see Appendix J) and 60 images which were rural (For an example see Appendix K). Participants were asked to rate the images on a 7-point scale (1= very rural and 7= very urban) and the images with the highest and lowest average ratings were used in the study.

*PANAS*: To determine if the screen content influenced participant mood, the Positive and Negative Affect Scale (PANAS) was used (Watson et al., 1988). The PANAS scale was selected as it has been proven to be a reliable and standardized method to measure mood (Crawford & Henry, 2004). The questionnaire comprises of twenty mood-related adjectives and participants were asked: “*to what extent do you feel this way*?”. Participants answered each question on a five point Likert type scale ranging from, ‘not at all’ to ‘extremely’. A full copy of the PANAS scale can be found in Appendix D.

Although the Positive and Negative Affect Scales are administered conjointly, they are two separate scales. Both scales comprise of ten items and these items are totaled together to give a final score. None of the items are reverse coded. Although the PANAS scale was initially designed as a paper-based questionnaire, in this experiment it was completed on a computer and the order the questions were presented was counterbalanced.

*Fatigue Task:* As a laboratory study is of limited duration, it was necessary to elevate participant stress levels to stimulate the stress associated with a workplace. A simple but challenging decision-making task was devised whereby participants were presented with a matrix, 32 by 32. (This resembles a large four-in-a-row board). This matrix was filled with a selection of red and blue dots and participants are asked to determine if there are more red or blue dots. (See Appendix L) However, to ensure the decision remained challenging, a staircase procedure was used to ensure that participants were always answering just above their performance threshold. This prevented the task from becoming too difficult and participants giving up on the task or it being too easy so that it failed to induce any stress. The staircase procedure meant that if a participant made a mistake than the next trial was made easier (the difference between the number of red and blue dots increased) and if they made the correct decision than the subsequent trial became harder as the difference between the number of red and blue dots decreased. The data from this aspect of the experiment was not analyzed.

*Burnout Measure:* To determine if the fatiguing task caused participants to feel burnt-out, the burnout measure of Pines and Aronson (1988) was employed. Pines and Aronson burnout measure was selected as it has been shown to positively correlate with the presence of job stressors (Etzion, Eden, & Lapidot, 1998). However, as the task was being used in an experiment rather than in a workplace setting the instructions were modified slightly. Participants were asked to “*Please rate to which degree does each of those statements describe your current mood.*” This differs from the original questionnaire, which asks participants “When you think about your work overall, how often do you feel the following?” Just like the original scale,



participants answered on a 7-point Likert-type scale, with responses ranging from 'never' to 'always' and no items were reverse coded. Previous research has demonstrated the scale has good internal consistency with Cronbach Alphas ranging from 0.88 – to 0.95. A full copy of the questions asked can be found in Appendix M.

*Backward Digit Span:* To measure participant's directed-attention, a Backward Digit Span (BDS) was utilized. This was selected as the BDS is a valid and reliable technique to measure attention in clinical trials (Lezak, 1983). Not only is it a reliable technique but it also replicates one of the dependent measures used in the Berman, Jonides and Kaplan (2008) study.

Participants initially heard an integer initially consisting of three digits and were asked to record the number in an answer booklet. To increase the difficulty of this task, participants were asked to write the integer down in reverse order (so 846 would be recorded as 648). Initially participants were presented with three numbers and the number of digits gradually increased to a maximum of nine digits. Participants were awarded one point for correctly recalling the list regardless of the length of the integer.

*Attention Network Task:* A second measure of attention was included, however unlike the BDS the ANT operationalizes the concept of attention in a more complex method, splitting the concept of attention into three different components: alertness, executive attention, and orientation. The ANT measure was developed by Fan, McCandliss, Fossella, Flombaum, and Posner (2005) and has been found to be a strong measure of attention.

Participants were presented with five arrows and asked to identify which direction (either left or right) the central arrow was pointing. (See Appendix N for a screen shot). However, while the arrows are presented on the center of the X-axes, they either appear on the top third of the Y-axes or the bottom third of the Y-axes. Participants indicate if the arrow is pointing left or right by pressing either the right or left mouse button. Prior to the arrows appearing on the screen participants are asked to focus on a fixation cross. The inter-trial interval (ITI) varied between 600ms and 3200ms. All participants completed 312 trials, but not all trials were identical. Trials differed to measure the different dimensions of attention.

To measure participant's executive attention, participants were asked to identify if the center arrow was presented in the same or opposite direction as the surrounding arrows. In total there were 104 congruent trials (with the center arrow matching the direction of the surrounding arrows) and 208 incongruent trial (with the center arrow in the opposite direction of the surrounding arrows). To measure orientation participants were provided with information in identifying whether the stimuli would be presented on the top or bottom of the screen. An asterisk either presented above or below the fixation cross-provided this information. To test for participant's alertness, prior to a number of trials commencing, participants were given a warning that the trial was about to begin (a double asterisk was presented in the center of the screen).

In total, 78 trials had a double asterisk, 78 had no cues, 78 spatial cues and 78 trials with no flanking. Participation reaction time to make a decision and accuracy was measured

*Filler Task:* To ensure the experiment lasted for a suitable duration, a filler task was required. Participants were told that the consumer psychology group had been commissioned to establish which prototype packing design consumers preferred for a range of products. (For an example of the product prototype see Appendix O) Computer generated prototypes were displayed on a computer screen for 45 seconds and participants were asked to rate each packaging on five dimensions: appearance, quality, cost, eye-catching, and likelihood to give as a gift. Participants rated these dimensions on a 7-point Likert scale for 12 different products. (See Appendix P.)

## **Procedure**

Participants arrived at the laboratory and prior to the experiment commencing they were taken to a briefing room where the experimental procedures were outlined and informed consent was obtained. Once participants consented to the procedure, they were taken to the testing laboratory, where they sat at one of three identical computers, each separated by a partition. From each computer terminal, participants could see the DSN although at no point were participants informed about the DSN, (either verbally or through non-verbal cues, e.g. the experimenter looking at the screen). The DSN was located in the middle of the wall enabling participants at all computer terminals to have a clear view. Although the DSN has the capability of providing auditory compliment, the screen only contained visual stimuli.

During the first stage of the experiment participants were asked to complete the PANAS questionnaire. Once all participants completed the PANAS questionnaire, they moved onto the fatigue task, which lasted approximately 30 minutes. The third

stage of the experiment was the filler task, which lasted exactly 12 minutes. Although this aspect of the experiment seems disjointed from the rest of the experiment, participants were told that it was an extra task that was not connected to the primary purpose of the experiment. Participants were told that this market research was just being added on to the end of all current experiments to boost numbers. In reality, this decision making task was included to ensure participants remained focused and engaged on the experiment as in a workplace scenario. Data from the decoy task were not analyzed. After the participants finished the decoy task they moved onto the BDS task and the ANT. The last dependent measure was the second version of the PANAS.

At the end of the experiment all participants were thanked and fully debriefed, the total duration of the experiment was approximately one hour.

### **Data analysis**

Data were then analyzed using a range of statistical tests conducted within SPSS

V.19.0

## Results

### Attitudinal

*Positive Affect:* A mixed between-within subject analysis of variance was conducted to assess the impact of the DSN content on participant's positive affect, prior and post intervention. This test revealed no significant interaction between intervention (DSN content) and time, Wilks Lambda = 0.96,  $F(2,57) = 1.08$ ,  $p = 0.35$ , partial eta squared = 0.03. However, there was a substantial main effect for time, Wilks Lambda = 0.63,  $F(2,57) = 33.99$ ,  $p < 0.01$ , partial eta squared 0.37. Although participants positive affect decreased across all three conditions, the main effect comparing the three interventions (nature DSN content, urban DSN content, and control DSN turned off) was significant,  $F(2,57) = 4.45$ ,  $p = 0.01$ , partial eta squared = 0.14, suggesting a difference between the interventions.

A Bonferroni post-hoc test indicated that at the end of the experiment participants had a significantly higher PA scores in the nature condition ( $M = 33.15$ ,  $SE = 1.87$ ) in comparison with the control condition, ( $M = 26.80$ ,  $SE = 1.67$ ),  $p = 0.02$  and a marginally significant difference from the urban condition ( $M = 26.85$ ,  $SE = 1.15$ ),  $p = 0.07$ . There was no significant difference between the urban condition and control condition at 0.05 level.

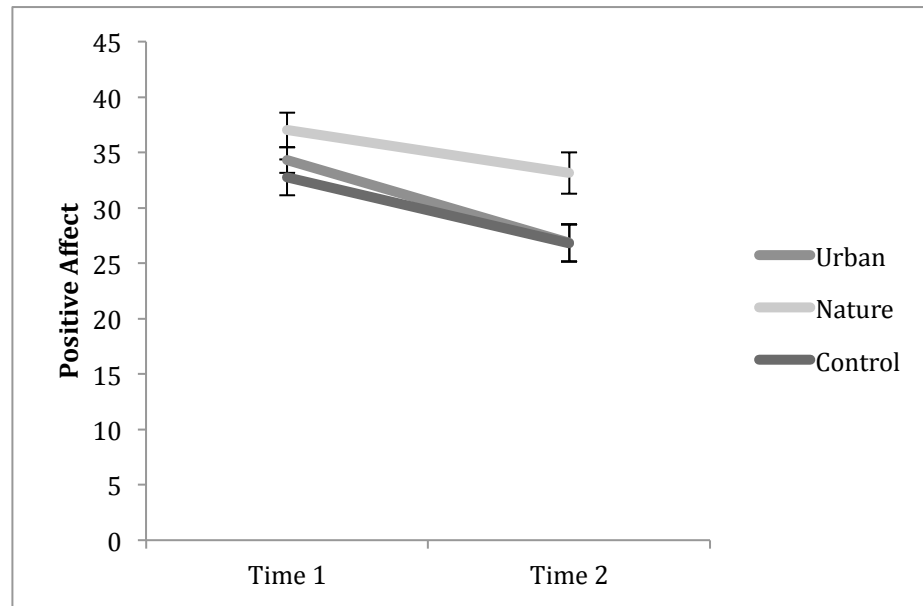


Figure 8. Change in participants Positive Affect (P.A.) over the course of the experiment by condition.. Analysis indicated that participants in the Nature condition experienced a significantly smaller decline in positive affect than participants in the nature ore control condition. Error bars are based on standard errors of the means.

*Negative Affect:* A second mixed between-within subject analysis of variance was conducted to assess the impact of the DSNs content on participant's negative affect, prior and post intervention. There was no significant interaction between screen content and time, Wilks Lambda = 0.94,  $F(2,57) = 1.85$ ,  $p = 0.17$ , partial eta squared = 0.06. However, there was a substantial main effect for time, Wilks Lambda = 0.88,  $F(1,57) = 7.62$ ,  $p < 0.01$ , partial eta squared 0.11. Although participants negative affect decreased across all three conditions, the main effect comparing the three types of interventions was not significant,  $F(2, 57) = 0.40$ ,  $p = 0.68$ , partial eta squared = 0.01, suggesting no difference between intervention.

Table 3: Participants mood before and after exposure to a DSN

	Urban			Nature			Control		
	n	M	SE	n	M	SE	n	M	SE
PA before	20	34.30	1.15	20	37.05	1.57	20	32.75	1.64
PA After	20	26.85	1.67	20	33.15	1.87	20	26.80	1.67
NA before	20	18.10	1.17	20	19.65	1.79	20	19.55	1.41
NA after	20	17.25	1.38	20	14.90	1.08	20	17.90	1.53

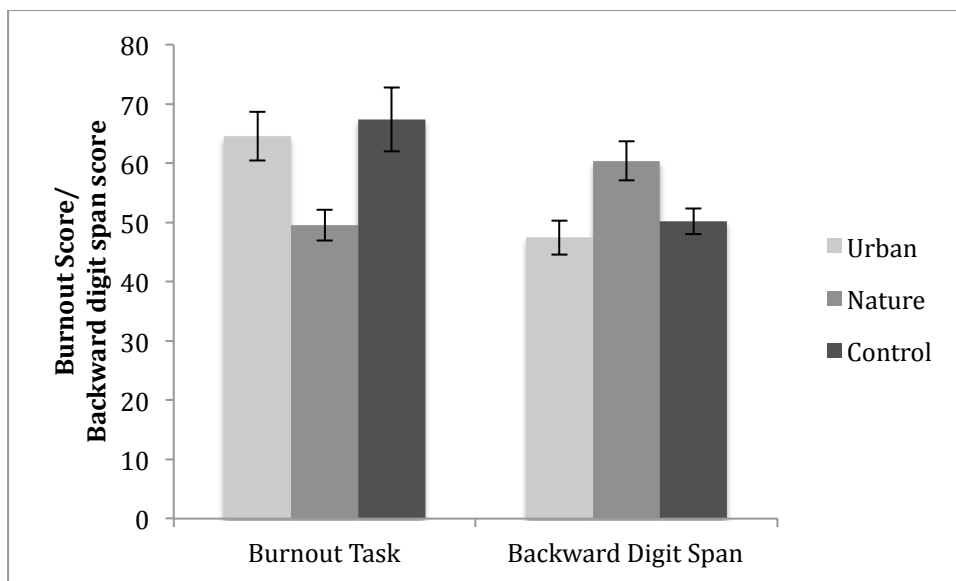
Table 4: Participant's burnout and attention levels after exposure to a DSN

	Urban		Nature		Control		<i>df</i>	<i>F</i>	<i>p</i>	$\eta^2$
	M	SE	M	SE	M	SE				
BURNOUT AND PERFORMANCE										
Burnout Score	64.55 <sup>a</sup>	4.12	49.55 <sup>ab</sup>	2.60	67.40 <sup>b</sup>	5.40	2,57	5.21	0.00	0.15
Backward Digit	47.45 <sup>a</sup>	2.89	60.40 <sup>ab</sup>	3.34	50.20 <sup>b</sup>	2.19	2,57	5.75	0.01	0.17
ANT STUFF										
Alerting (accuracy)	0.93 <sup>ac</sup>	0.12	0.97 <sup>a</sup>	0.01	0.98 <sup>c</sup>	0.00	2,237	8.671	0.00	0.07
Orienting (accuracy)	0.93 <sup>b*</sup>	0.02	0.97 <sup>*</sup>	0.01	0.98 <sup>b</sup>	0.01	2,57	5.542	0.05	0.08
Executive Attention (accuracy)	0.82	0.06	0.93	0.02	0.94	0.02	2,57	3.016	0.057	0.10
Alerting (rt)	544.84 <sup>*</sup>	9.88	513.83 <sup>*</sup>	10.86	519.97	7.50	2,237	2.976	0.053	0.02
Orienting (rt)	532.57	13.53	500.63	15.59	503.08	10.05	2,57	1.80	0.17	0.03
Executive Attention (rt)	625.39	26.01	589.93	25.32	603.05	17.40	2,57	0.595	0.55	0.02

Note: Means in a row sharing a subscript are significantly different from each other at the .05 level.

Means in a row sharing an asterix are marginally different from each other at the .06 level.

*Burnout:* A one-way ANOVA revealed a significant effect of DSN content on participants feeling of burnout caused by the task,  $F(2,57) = 5.21, p = 0.00, \eta^2 = 0.15$ . A Tukey post-hoc analysis demonstrated that participants in the nature condition felt significantly less burnout than participants assigned to either the urban ( $M = 64.55, SE = 4.12$ ) or control condition ( $M = 67.40, SE = 5.40$ ). There was no significant difference between the urban condition and the control condition at the 0.05 levels. An eta-squared value of 0.15 indicates a large effect size (Cohen, 1988).



*Figure 9:* Participants in the nature condition experienced significant lower score on the burnout task compared to participants in the urban or control condition. The same trend also occurred on the backward digit span task with participants in the nature condition outperforming participants in the urban or control condition. Error bars are based on standard errors of the means.

## Attention

*Backward Digit:* A one-way ANOVA revealed a significant effect of condition on participant's performance on a Backward Digit Span (BDS) task,  $F(2,57) = 5.75, p = 0.01, \eta^2 = 0.17$ . A Tukey post-hoc analysis revealed that participants in the nature condition were able to recall significantly more digits ( $M = 60.40, SE = 3.34$ ) than



participants assigned to either the urban ( $M=47.45$ ,  $SE = 2.89$ ) or the control condition ( $M = 50.20$ ,  $SE = 2.19$ ). There was no significant difference between the urban condition and the control condition at the 0.05 levels. An eta-squared value of 0.17 indicates a large effect size (Cohen, 1988).

*ANT*: A one-way ANOVA revealed a significant effect of condition on participant's alertness (accuracy)  $F(2,237) = 8.67$ ,  $p = 0.00$ ,  $\eta^2 = 0.07$ . A Tukey HSD post-hoc analysis revealed that participants in the nature condition were significantly more accurate ( $M = 0.97$ ,  $SE = 0.01$ ) than those in the urban condition ( $M = 0.93$ ,  $SE = 0.12$ ) and those in the control condition ( $M = 0.98$ ,  $SE = 0.00$ ) were significantly more accurate than those in the urban condition. An eta-squared value of 0.07 indicating a moderate effect size (Cohen, 1988).

A one-way ANOVA revealed a significant difference in participants performance on the orienting aspect of the task (accuracy),  $F(2,57) = 5.542$ ,  $p = 0.05$ ,  $\eta^2 = 0.08$ . A Tukey HSD post-hoc analysis revealed a significant difference with participants performing significantly better in the control condition ( $M = 0.98$ ,  $SE = 0.01$ ) than the urban condition ( $M = 0.93$ ,  $SE = 0.02$ ) and there was a virtually significant difference ( $p = 0.062$ ) between the urban condition and nature condition ( $M = 0.97$ ,  $SE = 0.01$ ). There was no significant difference between the nature condition and the urban condition.

Another one-way ANOVA revealed a marginal significant difference in participants executive attention (accuracy) between conditions,  $F(2,57) = 3.016$ ,  $p = 0.057$ ,  $\eta^2 = 0.10$ . As it was only a marginal difference a Tukey HSD post-hoc analysis failed to conclusively reveal where the differences occur. However, it provides a

strong indication that the differences occurred between the urban ( $M = 0.82$ ,  $SE = 0.06$ ) and control condition ( $M = 0.94$ ,  $SE = 0.02$ ) ( $p = 0.075$ ) closely followed by the urban and nature condition ( $M = 0.93$ ,  $SE = 0.02$ ) ( $p = 0.11$ ).

In relation to reaction time, there was no significant difference at the  $p = 0.05$  level or even a marginally significant result  $p = 0.06$  in participants reaction times for both orientating,  $F(2,57) = 1.80$ ,  $p = 0.17$ ,  $\eta^2 = 0.03$ , and executive attention,  $F(2,57) = 0.595$ ,  $p = 0.55$ ,  $\eta^2 = 0.02$ . However, in terms of alerting, participants did perform virtually quicker,  $F(2,237) = 2.976$ ,  $p = 0.053$ ,  $\eta^2 = 0.02$ . A Tukey HSD post-hoc test hinted that this difference is likely to occur between the urban condition ( $M = 544.84$ ,  $SE = 9.88$ ) and the nature condition, ( $M = 513.83$ ,  $SE = 10.86$ ). However, the effect size for this is only considered small based on Cohen's (1988) criteria. There appeared to be no difference between the control condition ( $M = 519.97$ ,  $SE = 7.50$ ) and either the nature or urban condition.

## Discussion

The results of this study indicate that passive exposure to a Digital Sign Network (DSN) displaying images of nature is capable of positively influencing participant's performance. Participants who were passively exposed to pictures of nature performed significantly better at a cognitively demanding task in comparison with participants who were exposed to images of urban scenes or those who were exposed to no images. Participants who were exposed to the imagery of nature also felt significantly less burnt out at the end of the task.

Although all groups experienced a decline in their positive affect scores (PA), participants who were exposed to images of nature had a higher PA score than those in the other conditions, suggesting a 'protecting' effecting of nature. It is not surprising that participants PA scores declined in all of the conditions, as participants were required to give up their time and participate in an experiment which most people would consider to be 'boring'. This result supports previous studies which also demonstrated that directly interacting with nature can improve an individual's mood (Cooper, 1999; Ryan et al., 2010). However, this is the first time that 'passive exposure' to artificially simulated nature has demonstrated a change in participant's mood.

Although ART makes no predication that exposure to nature will change participants mood, it can be speculated that this change occurs due to a similar mechanism that operates in mood induction studies. Many laboratory-based studies induce a mood in participants by exposing them to positive images (Yang et al., 2009). While we did not conduct a pilot or post-hoc study to establish if participants rated the images of nature in a positive light, previous research has demonstrated that

images of nature are consistently rated as having a positive valance (Lang et al., 1997). Consequently, it appears logical that exposure to images of natural landscapes would induce a positive mood in participants.

Yet while participants PA scores were protected, there were no significant differences in participants NA scores. This is not surprising for a number of reasons. Firstly, the PANAS scale treats the PA and NA as two independent concepts (Watson & Clark, 1994). Over the long-term PA and NA are independent of each other however in a short term, (like our study) they start to correlate strongly (Diener & Emmons, 1984). Despite this, many studies which seek to induce a positive mood, detect a change in PA but not NA (Kangasharju & Nikko, 2009; Schneider, Gur, Gur, & Muenz, 1994; Straw et al., 1994). This apparent contradictory finding can be explained by the questions asked as part of the NA scale and the environment in which they completed the experiment. In order to complete the NA participants were asked to what degree they feel: afraid, scared, nervous, jittery, irritable, hostile, guilty, ashamed, upset and distressed. At the start of the experiment, participants may have felt slightly nervous, jittery or afraid as they were not exactly sure what was going to happen during the course of the experiment. These emotions are likely to be very low and a positive mood induction is unlikely to influence these emotions. By 'time 2' participants are aware that the experiment is just about to finish and they are unlikely to feel nervous or afraid. They may feel bored, tired, and even fed up by the end of the experiment but these emotions are not measured by the NA scale. This would explain the decrease (albeit non-significant) in participants negative affect score at the end of the experiment.

The results of the burnout measure revealed that participants who were exposed to the DSN displaying natural scenes had significantly lower burnout scores

than those who were in the urban or control condition, providing support for our initial hypothesis. Within a workplace context, burnout is normally described as experiencing emotional exhaustion (Maslach & Jackson, 1981). This is usually experienced after prolonged exposure to an emotional stressor (Maslach, Schaufeli, & Leiter, 2001). While this definition initially suggest that participants are unlikely to experience burnout in just a one-hour study, we believe that participants are likely to have felt frustrated by the fatigue task, producing a mild form of burnout.

We believe that attention restoration theory (ART) can be used to explain this result. Participants who were assigned to the nature condition experienced lower levels of burnout because the scenes of nature involuntarily captured participant's attention from the primary task, providing a break. In order to accurately determine if this is the correct mechanism, we would have needed to quantify the amount of time participants spent interacting with the screen (e.g. via eye movements towards the screen, fixations, etc). While we did not measure this in a quantitative method, qualitative data were collected as part of the debrief procedure. These qualitative data suggest that the majority of the participants in the nature condition looked at the screen a number of times throughout the tasks. Participants suggested that their motivation for focusing on the screen was the fact that they "found it relaxing to quickly view the pictures" The results from the urban condition are not so positive. They revealed that while participants initially engaged with the screen when entering the room, they reported finding the screen content 'boring' and 'dull' and choose to ignore it.

If participants found the screen content intrinsically fascinating and were distracted by it, it is logical to assume that they may have experienced a decline in performance. However, the results from the Backward Digit Span (BDS) appear to

contradict this logic as participants in the nature condition performed significantly better than those in the control or urban conditions. This result supports the previous findings of Berman Jonides & Kaplan (2008) who also demonstrated that participants performance on the BDS improved after being exposed to images of nature, although in these studies participants were forced to directly interact with the images. With the BDS it is not surprising that participants performance did not suffer. This is because in order to perform well on the BDS task, participants are required to concentrate on auditory stimuli. Consequently, participants did not need to focus on the computer screen, but could look around the room as the relevant information for the BDS is communicated via the headphones.

A more comprehensive test of attention is the Attention Network Test (ANT) as this seeks to directly measure participant's attention level. This measure of attention also has greater implications for business because in order to perform well in this task, participants are required to concentrate on the computer monitor, as is more likely to be the case in a workplace environment. The results on the ANT task were mixed, although on the whole they do support the results of the BDS task. Of the three measures of attention, we would have expected executive control to be the most likely to have been influenced by the presence of nature. This is because this form of attention requires a greater degree of cognitive control and is concerned with directed attention in activities such as planning actions, anticipating consequences, and selecting among competing demands to name a few (Mezzacappa, 2004). However, in terms of both accuracy and reaction time, there was no difference in participant's performance. Contrary to expectation, there was no significant difference between participants alerting attention in the 'nature' condition and the control condition.

Alerting attention is the most basic form of arousal and measures a participants ability to preserve a 'state of alert arousal' (Mezzacappa, 2004).

An unexpected finding was that participants in the urban condition performed significantly worse than those in both the control or nature condition. At first this would suggest that the DSN would not bring any advantages to organizations, as there was no difference between the nature or control condition. Although we suspect that the situation may be more complicated. This research was conducted at a very rural university and from many points around the campus, students and staff are able to look out over the mountains of Snowdonia. Consequently, our participants are not routinely exposed to urban environments. If the experiment were to be repeated in an urban environment, (e.g. London or New York), participants in the control condition would have been routinely exposed to urban scenes and consequently, it is possible that a significant difference between the control and nature condition could be detected, (as they would be in a similar position to the participants in the urban condition in our experiment).

In terms of orientating attention, the ability to shift attention from one stimulus to another (Mezzacappa, 2004), there is a significant difference between the urban and control condition and a marginal significant difference between the urban and nature condition. We think that this experiment needs to be repeated in an urban environment to establish if the control condition reflects the results found in the urban condition as we hypothesize. If this does prove to be the case, this would provide further evidence to support ART. Even if exposure to digital images of nature fails to change participant's performance we found no evidence to suggest it has any negative impact, and it is still likely to improve participants mood.

## Conclusion and Limitations

The key factor which differentiates this study from previous research, is that here participants were passively exposed to the stimuli rather than being forced to directly engage with them. To ensure that participants voluntarily engaged with the screen without prompting, the experimenters were instructed not to look at or mention the screen. Despite this, the novelty of the screen could have caused participants to look at it. Although the DSN was installed prior to the start of the experiment, participants are likely to have participated in a number of experiments in different laboratories. The majority of these studies take place in very similar laboratories, consequently the DSN would have stood out as novelty attracts attention (Johnston, Hawley, Plewe, Elliott, & DeWitt, 1990). Even if the screen captured attention because of the ‘novelty factory’, the novelty factor should have been identical for all conditions. Consequently, this would not explain why there was only a change in behavior in the nature condition.

Despite this, the study has made a positive step forward in terms of making the paradigms and findings of the ART literature relevant to the modern workplace. However, further work is still needed. Although we detected a clear effect of nature scenes on participant performance, a number of questions remain un-answered. First, it is unclear how long the effects will last. In our experiment participants were continually exposed to the content loop including when the dependent measures were quantified. Consequently, we do not know if the results would carry over to periods after which exposure had ended. Secondly, our content loop was only comprised of 50 images. It is possible that eventually these images would experience a wearout effect, and participants would become familiar with the images and they may eventually stop



impacting performance. Previous research fails to provide any guidelines on this issue as although ART has been detected with just a plant on the desk, no study has tried to detect ART over longer periods of time.

The final limitation with our study is concerned with the environment in which our experiment was conducted. Our experiment was conducted within a laboratory context and all of the participants were university students. Although this will have some bearing on the ecological validity of our study, there is no evidence to suggest that ART is more likely to occur in younger individuals than adults. In relation to the fact that it was conducted in a laboratory setting, the effect needed to be proven to be robust before it should be tried within a business environment to test the relevant hypotheses more broadly.

To conclude, this study has provided the first evidence that passive exposure to scenes of nature can improve both participant's task performance and mood. While we acknowledge a number of limitations connected with this study, we believe our findings are exciting enough to encourage future research in this area, as this area of research could lead to significant improvements in performance in a corporate environment.

## **5. Social norms in the workplace: “Nudges” in the Workplace Can Improve Time-on-task behavior**

### **Introduction**

#### **Cyberloafing in the workplace**

One way for businesses to make quite substantial savings is by reducing ‘cyberloafing’, that is employees using the Internet for personal use. Young and Case (2004) estimate that approximately 70% of all companies provide Internet access to at least half their employees . While access to the Internet is provided to aid employees in their work, researchers such as Barlow, Bean, and Hott (2003) have estimated that between 30-65% of all internet usage in the workplace is non-work related. Such personal Internet usage includes sending non-job related e-mails (84%) and surfing the Internet for pleasure during work hours (90%). A report by valt.com (1999) estimated that annually cyberloafing cost the US economy \$54 billion in lost productivity. Not only do corporations incur heavy opportunity costs when employees engage in cyberloafing, but such activities also have a detrimental effect on those trying to work. Surfing the Internet for personal use, (especially when downloading large files, such as music or movies) absorbs a great deal of bandwidth, which reduces internet speeds and often requires organizations to invest in more expensive infrastructure to maintain acceptable internet speeds (Martin & Freeman, 2003).

To tackle this growing problem, many businesses have started using electronic surveillance techniques. The American Management Association (American

Management Association, 2007) reports that 66% of all companies monitor employee internet use and 43% monitor e-mails. Results suggest that cyberloafing is reduced if employees are aware their computer usage is being monitored (Ugrin, Pearson, & Odom, 2011). However, this decrease in cyberloafing comes at a price. When employees are aware that they are being monitored, they also experience a decrease in job satisfaction (Urbaczewski & Jessup, 2002) and a decrease in both their physical and psychological health (Hartman, 1998). Evidence from Self Determination Theory (SDT) also suggests that surveillance in the workplace decreases employees feeling of autonomy, resulting in employees feeling that the locus of causality is external and not internal (Gagne & Deci, 2005). As a result, employees performance is likely to suffer (Deci & Ryan, 2004). Such findings suggest that Internet monitoring may be a poor solution to cyberloafing in the long-term. A less invasive and subtler form of behavior modification may be required.

### **Group Conformity Effects**

In many situations, people ignore facts and instead rely on heuristics to guide decision-making. Heuristics are rules of thumb that individuals use facilitate decision making (Jansson-Boyd, 2009). One such heuristic is the principle of social proof (Cialdini, 1993). Cialdini argues that if a significant number of our peers make the same decision, we defer to their wisdom, believing that they ‘can’t all be wrong’. However, rather than explicitly asking our peers what they believe, we seek to mimic their socially visible actions. Consequently, the actions of our peers impact a wide range of behaviors including when we lose our virginity (Maxwell, 2002), drug use (Lundborg, 2006), alcohol consumption (Weitzman, Nelson, & Wechsler, 2003), and littering (Cialdini, Reno, & Kallgren, 1990).

Based on such conformity effects, we hypothesize that if employees can be made to believe that cyberloafing is abnormal behavior, then this belief should decrease the likelihood that they will cyberslack.

However, one limitation of using society norms to change behavior is that they only influence behavior, when the individual focuses on how society views their actions (Cialdini et al., 1990; Rutkowski, Gruder, & Romer, 1983; Schwartz & Fleishman, 1978). Consequently, people are more likely to litter when there is no litter present compared to seeing just one piece of litter present. If there is no litter, we do not think that our society views littering negatively. However, if we see just one piece of litter, it acts as a retrieval cue, reminding us that society reflects negatively on littering (Cialdini et al., 1990).

Nearly half of all colleges and universities across the United States use this type of social norms marketing to reduce drinking (Wechsler et al., 2003). They do this by displaying messages such as “*Most students have five or fewer drinks when they party*” (Wechsler et al., 2003:485). The reason this message works is because we know that adolescents tend to over-estimate how much their peers drink (Baer, 1994). Thus by exposing them to this message we can both adjust these expectations and as a result alcohol consumption falls.

Here we investigate whether a similar technique can be used within a simulated business environment to reduce cyberloafing. Specifically, we wanted to see whether we could decrease cyberloafing amongst ‘employees’ (students) who are given a task to complete (study for a test) and access to computers. We chose to use digital signs (computer controlled displays) as the communication channel through which we set societal norms. We chose to use digital signs because they are flexible,

popular, and are rapidly becoming common sights in retail, corporate, and academic environments (Intriligator, 2008). Furthermore, digital signs are more effective than traditional channels at capturing attention (SeeSaw Networks, 2007). Consequently, we predicted that if a digital sign contained information manipulating the amount of time “the average employee” spends on social network websites, then we would expect to see a decrease in cyber-loafing, which leads us to:

H1 Participants exposed to information suggesting a low average time spent on social network sites will spend less time on social network sites than those informed of the correct time spent on such sites.

## **Method**

### **Participants**

Sixty-two third-year psychology students (38 female, 24 male;  $m = 20.53$   $SD = 1.25$ ) participated in the study in exchange for course and/or print credits. All were informed that they were participating in a study investigating the impacts of environmental cues on learning strategies and that they were free to withdraw at any point. Of the 62 participants, one was excluded from the final analysis after withdrawing from the experiment to go to the toilet.

### **Apparatus**

Materials used in this experiment consisted of a 32” digital sign (NEC MultiSync 3120, controlled by a standard PC), which was mounted on the wall one meter behind the central participant’s computer monitor (See Appendix I). The bottom edge of the digital sign was 32 cm above the top of the computer monitor (thus, when facing their monitors, all participants could comfortably notice the digital sign on the wall out of their direct line of sight). In addition, participants used one of three standard PCs, all of which were running SpectorSoft’s Spector Pro activity monitoring software. The Spector Pro software monitors all user activity, recording all keystrokes typed, websites visited, and the duration of each website visit. Although the software can log passwords and other personal details, this feature was disabled for ethical reasons.

## **Independent Variable**

We developed two content loops for the DSN--an experimental and control content loop. Both content loops included experimental and filler content. The filler content was similar to screen content of other digital signs used throughout the university including information such as new publications by staff, upcoming talks and symposiums, and important health and safety announcements (e.g. fire drills). Both the experimental and control content loops used the same filler content. However, the typical student is unlikely to find this information engaging as it is not relevant to them (Greenwald & Leavitt, 1984), consequently typical facts about the ‘average’ student were also included. These included:

- The average number of pints of beers that a student drinks in a week;
- The average number of sexual partners a student has while at university;
- The average amount of money a typical student spends on alcohol per week;

As with the filler content, these interesting facts remained constant across both the high and average conditions. However, there were two additional facts (varied between conditions) included in both groups. These facts were: “The average student spends {4 or 9} hours per week on Facebook”, and “the average students takes {5 or 9} hours to write a 2,000 words essay.” The first message was included in an attempt to directly alter participant’s facebook usage, where as the second message was included to influence how productive they were. For example screen shots of the experiment, please see Appendix Q).

## **Dependent Variable**

*Mock “Life in the UK” test:* Participants completed our own version of the “Life in the UK” (citizenship) test modeled after the official UK test. The 25-item test probed participant’s knowledge of five main topic areas (a changing society, the UK today: A profile, how the UK is governed, everyday needs, and employment). All questions on our test were selected from the Official Citizenship Test Study Guide (Stationery Office & Great Britain Home Office, 2008). A copy of the questions asked can be found in Appendix R. Participants were given 30 minutes to study (details below) and then 15 minutes to complete the test (under test conditions).

## **Procedure**

Participants were recruited via an advertisement located on the department intranet. The advertisement asked for volunteers to engage in a study, “investigating the role of environmental cues (e.g. music and lighting) on learning strategies”.

After arrival, participants read an information sheet and was asked to sign a consent form that included the statement: “I understand that my performance and actions will be recorded.” Participants were next randomly assigned to a condition (experimental or control) and taken into one of the testing laboratories.

The testing laboratories contained three computers each separated by partitions (to ensure a sense of privacy) replicating a basic library or call-center environment. A digital sign was located above the middle computer terminal. This sign was displaying one of the two content loops (on loop) before participants entered



the laboratory. At no point did the experimenter make any reference to the screen. To try and prevent participants from becoming suspicious of the DSN, the screen was installed a month prior to the start of the experiment, and displayed generic content for this period. Over this month a significant number of the participants would have been to the laboratories and become accustomed to seeing the screen.

Participants were given an information sheet informing them that in 30 minutes they would sit a mock life in the UK test and they were to use the remaining time to prepare for the test. The participant information sheet included a list of seven online resources to help them prepare for the test and during this 30-minute “study time” participants were left in the laboratory unobserved.

After 30 minutes the experimenter asked participants to turn off the computer monitor and complete the mock “life in the UK test.” This test was completed while participants sat at their individual workstations.

## **Data Analysis**

Participant’s performance on the ‘Life in the UK’ test was scored using the answers from the official test guide. To determine if there was a difference in behavior between the control and experimental conditions, an independent sample T-test will be conducted in SPSS V. 19.0 on the following variables. Time spent on relevant websites;

- Time spent on Facebook;
- Time spent on chat;

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- Time spent on online games;
- Time spent on e-mail;
- Time spent on news websites;
- Participants’ performance on the Life in the UK test.

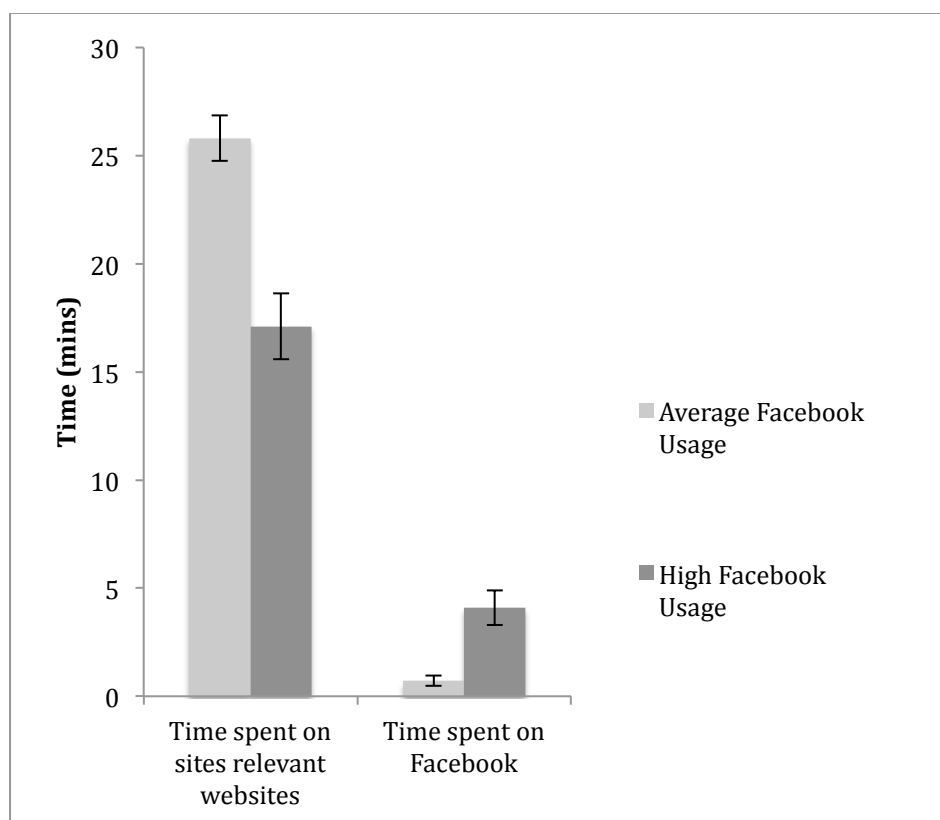
## Results

The results in Table Six suggest that a social norms marketing campaign could be a successful technique to reduce cyberloafing within the workplace. An independent-sample t-test suggest that participants spent significantly more time relevant websites in the ‘average Facebook usage’ condition ( $M = 25.81, SE = 1.05$ ) than the ‘high Facebook usage’ condition ( $M = 17.11, SE = 1.52$ );  $t(51.92) = 4.70, p = <0.01, \eta = 0.27$ .

An independent- sample t-test suggest that participants spent significantly less time on Facebook in the ‘average Facebook usage’ condition ( $M = 0.71, SE = 0.24$ ) than the ‘high Facebook usage’ condition ( $M = 4.09, SE = 0.80$ );  $t(34.08) = -4.06, p = <0.01, \eta = 0.22$ . However, there was no statistical difference on the time spent on online chat between the ‘average Facebook usage’ condition ( $M = 0.67, SE = 0.39$ ) than the ‘high Facebook usage’ condition ( $M = 0.59, SE = 0.34$ );  $t(59) = 0.15, p = 0.88, \eta = 0.00$ . Again there was no statistical difference on the time spent on online games between the ‘average Facebook usage’ condition ( $M = 0.40, SE = 0.28$ ) than the ‘high Facebook usage’ condition ( $M = 0.51, SE = 0.41$ );  $t(59) = -2.20, p = 0.83, \eta = 0.08$  and again there was no statistical difference in the time spent on online chat between the ‘average Facebook usage’ condition ( $M = 0.67, SE = 0.39$ ) than the ‘high Facebook usage’ condition ( $M = 0.59, SE = 0.34$ );  $t(59) = 0.15, p = <0.88, \eta = 0.00$ .

Yet despite participants in the ‘average Facebook usage’ condition spending significantly more time revising, it did not appear to impact performance as an independent – sample t-test suggest that participants did not perform any better on the life in the UK exam in the ‘average Facebook usage’ condition ( $M = 12.84, SE =$

0.491) than in the ‘high Facebook usage’ condition ( $M = 12.23$ ,  $SE = 0.54$ );  $t(59) = -0.54$ ,  $p = 0.59$   $\eta = 0.06$ .



*Figure 10:* Time participants spent on different activates during the experiment. Analysis indicated that participants in the average Facebook condition spent significantly more time on relevant websites and less time on Facebook than participants in the high Facebook condition. Error bars are based on standard errors of the means

Table 5: Time spent (mins) on various activities/websites while in the revision (study) phase of the experiment

	Average Facebook Usage (n=31)		High Facebook Usage (n =30)		N	t	p	$\eta^2$
	$\bar{x}$	SE	$\bar{x}$	SE				
Time spent on sites relevant to the life in the UK test	25.81*	1.05	17.11*	1.52	51.92	4.70	<0.01	0.27
Time spent on Facebook	0.71*	0.24	4.09*	0.80	34.08	-4.06	<0.01	0.22
Time spent on online Chat	0.67	0.39	0.59	0.34	59	0.15	0.88	0.00
Time spent on Games website	0.40	0.28	0.51	0.41	59	-2.20	0.83	0.08
Time spent on E-mail	0.60	0.31	0.85	0.31	59	-0.57	0.57	0.01
Time spent on News websites	0.25	0.17	0.77	0.38	40.74	-1.26	0.21	0.03
Exam performance	12.84	0.491	13.23	0.54	59	-0.54	0.590	0.06

Note: Means in a row sharing a subscripts are significantly different from each other at the .05 level.

## Discussion

This experiment has clearly shown that social norm marketing can reduce cyberloafing in a simulated workplace environment. Furthermore, it has also demonstrated that digital signage can be a successful medium for such social norm marketing campaigns. Although at first glance the digital sign used in our experiment and a traditional social norm poster appeared similar, there is a key difference. This is because unlike a traditional social norm poster, a digital sign is a dynamic communication medium. As a result rather than just displaying one message (e.g. like a poster), the information designed to change participants behavior was displayed over a number of different slide that continually change. As a result of this difference it was unclear from whether a DSN would have the same effect.

As discussed above, previous research has demonstrated the social norm marketing can be used to achieve such desirable ends as reducing alcohol consumption (Lewis & Neighbors, 2006; Perkins, 2002), and not littering (Cialdini et al., 1990). The present work extends this previous research on social norms marketing into a new arena: the workplace.

Unfortunately, while we demonstrated a successful reduction in the use of Facebook and an increase in work-related activity, there was not a corresponding improvement in task performance. We speculate that this occurred because the performance measure (number of questions answer correctly) had highly variable levels of performance. For participants to perform well on this test, they required an excellent knowledge of British history, politics, and culture. Consequently, the thirty minutes participants had to prepare for the exam was not sufficient to improve performance. However, in a workplace setting time-spent cyberloafing would directly

effect performance. This is because any wasted time will undermine performance, and by definition more time on Facebook will mean lower performance.

While employees do have the option of limiting which websites an employee visits, in the long run this tactic is likely to be less beneficial than encouraging employees to voluntarily reduce their Facebook usage. This is because if an employee perceives that their employer is trying to control them, than it could potentially trigger the psychological state of reactance (Brehm, 1966) and cause frustration amongst employees. Consequently in an attempt to regain a sense of control over the situation they are likely to engage in some form of workplace deviance or work slower (Lawrence & Robinson, 2007).

The more serious implication for this research is the application of this finding in the workplace. While we demonstrated how a social norms marketing campaign could be used to reduce cyberloafing, the environment in which this was demonstrated was somewhat artificial. The experiment took place in a dedicated testing laboratory and although this did vaguely resemble a call center or library, the scale and consequently the proximity to the DSN is considerably different. Most call centers within the UK consist of between 21 and 50 employees (Bristow, Munday, & Gripaios, 2000). Such larger spaces would result in employees being located farther away from the DSN, which could potentially reduce its effectiveness.

Consequently, to determine if similar effects could be observed in more realistic environments, we conducted a second experiment in a more ecologically valid environment with multiple distractions. In this experiment, we sought to try and tackle a different albeit related phenomena: employee dishonesty.

## **6. Passive Priming Can Improve Integrity and Reduce Theft**

### **Introduction**

#### **White-collar crime in the workplace**

While abuse of the Internet is a relatively new problem, physical theft and white-collar crime are long established workplace problems (Greenberg & Barling, 1996). According to the Association of Certified Fraud Examiners (Association of Certified Fraud Examiners, 2008), in 2008 the US economy lost approximately \$994 billion to white-collar crime. This figure suggests that the typical US organization loses 7% of its annual revenues to white-collar crime (Association of Certified Fraud Examiners, 2008). This is not a problem isolated to America, a similar analysis in the UK put the cost to the British economy at £60 billion a year (Taylor, 2009). The media spotlight gives the impression that most white-collar business crimes are perpetrated by CEO's and Managing Directors seeking to exploit investors (e.g. Bernard Madoff, 2009; Nick Leeson's, 1992; Guinness share-trading fraud, 1980's). However, this neglects the impact of petty crime in the workplace; the cumulative effects of which are substantial.

To date, there has been limited research exploring and quantifying the impact of petty crime. However, research estimates that 40% of all employees steal from their employers (Lipman & McGraw, 1988). Estimates as to how much this costs the US economy range from between \$40 billion a year (Lipman & McGraw, 1988) to



\$400 billion a year (when including internal fraud) (Wells, 1999) and the situation is similar in the UK with the British Chamber of Commerce (2002) reporting that 12% of all crimes committed against its members were perpetrated by employees. In some sectors this figure could be considerably higher. For example, in the retail sector estimates suggest that in 1999 employees perpetrated 50.8% of all crimes (Centre for Retail Research, 2005).

Worryingly, employee theft is on the increase: in 1995/1996 the rate was approximately 29 crimes per 100,000 in population, but by 1999/2000 this rate increased by about 14% to 33 crimes per 100,000 of the population (Rickman & Witt, 2007).

The increase of petty crime within a workplace is a concern, as this can lead to a shift in organizational culture. This change occurs due to the principle of incrementalism or the so-called wedge effect. According to this rule, employees start off by taking one or two small things (e.g. a ream of paper), and if they can 'get away with it', then the dishonest activity escalates. Once employees start to believe that stealing from work is the norm, the trend expands in depth and width, involving more people and larger thefts. Research demonstrates that humans are prone to a conformity effect; they seek to mimic the behavior of their peers, as demonstrated in our previous experiment and in numerous previous studies (Asch, 1955; Cialdini, 1993; Weitzman et al., 2003). Consequently, if an employee observes their colleagues stealing they believe it is the social norm, and a culture of theft could occur.

### **Environmental cues and decision-making**

Our previous work demonstrated that a DSN is capable of subconsciously activating participant's societal expectations, which resulted in a decrease in cyber loafing. There are other techniques used within psychology that can, perhaps subconsciously, activate thoughts that might result in behavior change. One such phenomena is priming, which is defined as the 'facilitative effect of an encounter with a stimulus on subsequent processing of the same stimulus (direct priming) or a related stimulus (indirect priming),' (Cassidy & MacDonald, 2007; Shek & Schubert, 2009; Tulving, Schacter, Stark, & Fund, 1982). In other words, when the brain processes a single stimulus, it activates an array of semantically, lexically, visually, emotionally, and functionally linked themes (Ferguson & Bargh, 2004). For example, if a participant is presented with the word 'cheetah', that might trigger associated thoughts, including perhaps, Africa, legs, big cats, domestic cats, fur, spots, or even cards. It is impossible to know what associations an individual will create, because the effects will differ based on an individual's prior experiences with the primary stimulus. Bruner (1957) claimed that priming causes participants to go 'beyond the information given' and derive far more information than that which is initially presented.

Many researchers believe that priming can influence complex social behavior without the individual becoming consciously aware of it (Bargh, 2005). For example, Bargh, Chen, & Burrows (1996) primed participants by asking them to undertake a sentence completion task with words traditionally associated with an older demographic (e.g., grey, bingo, and knitting). After this priming task, researchers covertly measured the speed at which participants walked down a corridor. They found that participants primed with elderly associations took nearly 12.5% longer to walk the same distance as non-primed people. Other studies have demonstrated that

priming can also influence complicated behavior including an individual's functional intelligence level. For example, in one task (Dijksterhuis & van Knippenberg, 1998) participants were primed by being asked to list traits associated with either professors or supermodels. Subsequently, when asked to answer quiz-style questions, they found that those who had been primed to think about professors answered 28% more questions correctly than those primed to think of supermodels. In addition, a number of the primed participants were asked to complete a cognitively demanding task between the priming and the quiz. The results showed that the strength of the priming relationship did not weaken after the task intervention. This suggests that the effects of priming are not as short term as other induction techniques (e.g., mood inductions, Kim & Kanfer, 2009)

### **Priming, honesty, and the workplace**

Although priming has been used for numerous behavioral interventions, it has yet to be used as a technique to reduce crime. However, recent evidence has suggested that priming can successfully be used to enhance an individual's honesty level. Randolph-Seng and Nielsen (2007) conducted a study using two control conditions -- no prime and a sports prime (which should not impact performance on this task). A third group received a prime about religion. After priming, researchers asked participants to complete Leming's cheating task (Leming, 1978). The results show a strong effect: among those exposed to a religious prime, nobody cheated on the subsequent task. Where there was no prime, 44% of participants cheated, and that figure rose to 50% of candidates exposed to the sports prime.

Mazar, Amir, and Ariely (2008) replicated Randolph-Seng's study, although Mazar et al.'s study did not generate as strong an effect. Mazar et al. primed participants by asking them to try to list the Ten Commandments. Regardless of an

individual's religious preferences or Biblical knowledge, participants cheated substantially less in a subsequent task. Mazar explained these results by suggesting that even participants with only a limited education of the Bible are aware that religious books provide moral guidance and attempt to teach people how to live a good life. Thus, asking people to think about the Ten Commandments primes moral or ethical concepts, and this priming exerts an influence on subsequent behavior.

Although participants were unaware that the prime influenced their behavior in both the Mazar et al. and Randolph-Seng studies, the priming task still required direct engagement in a completely separate priming task (e.g. stem completion task, crosswords, etc). Consequently, such a direct intervention has limited application in a workplace scenario. Employees are unlikely to voluntarily engage in a separate priming task, as it would distract them from their main job. What is needed, is a way to 'passively' prime employees in the workplace so as to not interfere with the primary tasks of employees. As the experimental evidence has not focused on the applied application of priming, it remains unclear whether passive priming can affect honesty in the workplace.

The current study seeks to address this question by using religious concepts to induce honest behavior in an implicit way. This is achieved by presenting participants with information associated with religious behavior as part of the content of a Digital Sign Network (DSN). However, unlike in study one, where the experiment was conducted in a testing laboratory, this experiment was conducted in a kitchen-like common room. This setting had multiple distractions and only had the screen presented on a sidewall while participants were explicitly asked to direct their attention in another direction. To ensure the primes are disguised as part of the normal screen content, they were presented as part of a daily quiz.

This leads us to the following hypothesis:

- H1 Participants who have been passively exposed to morality-related questions will act more honestly than those who have been exposed to general knowledge questions.

## Method

### Method Overview

As will be described in greater detail below, participants (in groups of three or four) were led into a large student kitchen/common room. Researchers instructed participants to rate, with pen and paper, a series of consumer products, images of which appeared on a large projector screen. Simultaneously, in a corner of the same room, a large digital sign (DSN) displayed a seemingly generic loop of campus news, information on upcoming local events, and items in a general-knowledge quiz format. Researchers focused participants on the product-rating task; the DSN screen was never mentioned or indicated.

In reality, however, the product-rating task served only as a decoy, a focus designed to hold participants' active attention, so that they attended to the DSN messages only passively and herein lay the prime. While half of participants were passively exposed to truly generic information, the other half saw quiz questions designed to prime thoughts and feelings that would lead them to act with integrity.

After the decoy-rating task (and the passive exposure to the DSN) all participants then performed several short tasks designed to assess their honesty levels, either explicitly (via a questionnaire) or implicitly (self-reporting on a maths task and stealing pens from the room). Figure 1 portrays the experimental design used.

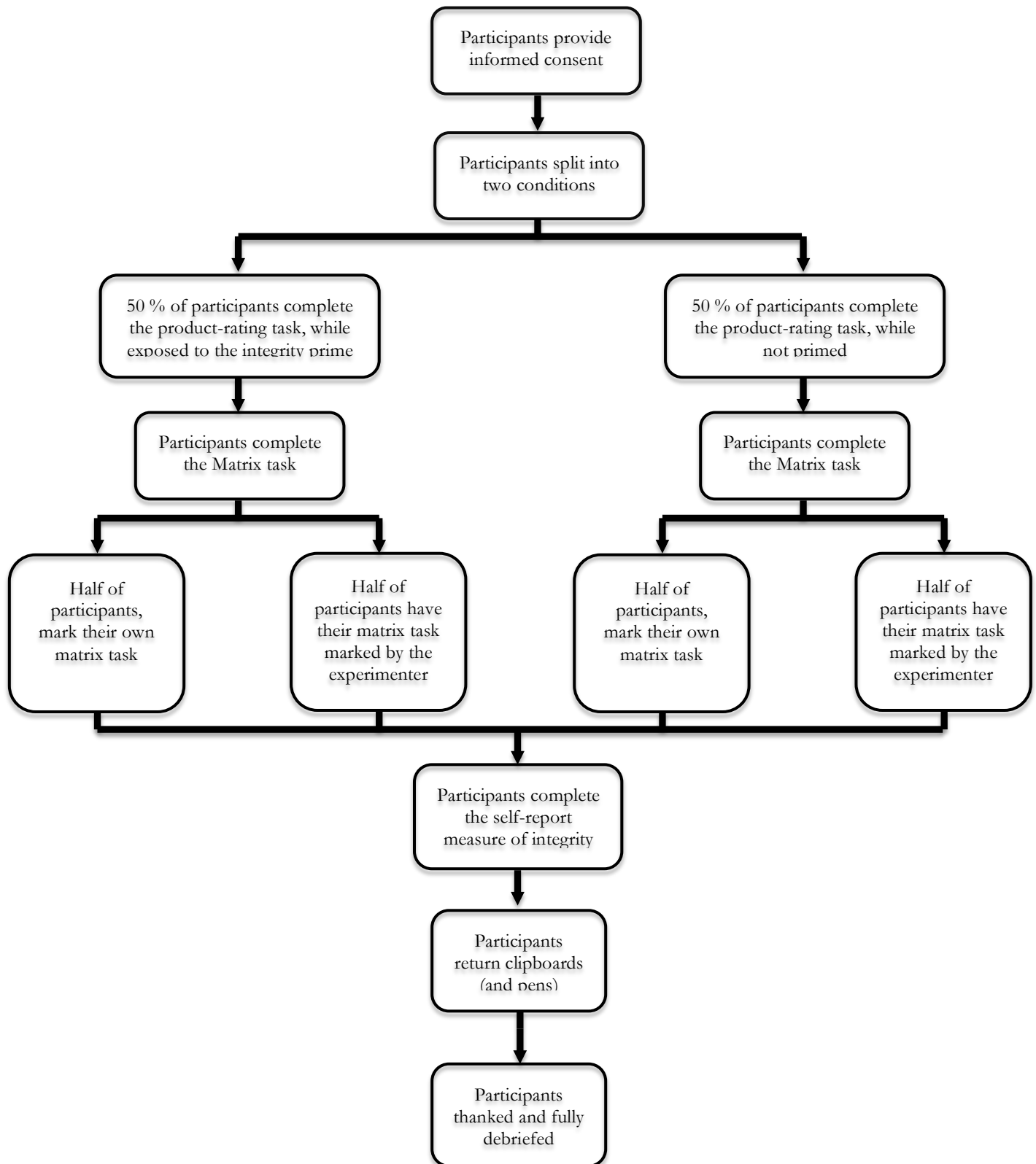


Figure 11. Method overview for Passive priming can improve integrity and reduce theft

## **Participants**

Fifty university students (25 females and 25 males) aged between 18 and 24 participated in the study. Participants were remunerated with partial course credits for completing this study and were free to withdraw at any point. Consent was obtained from all participants before the study began.

## **Apparatus**

Materials used in this experiment consisted of a 32" digital sign (NEC MultiSync 3120, controlled by a standard PC), mounted in the corner of a common room (See Appendix S), ballpoint pens, a self-report moral attitudinal questionnaire, and a pencil-and-paper number-based search task.

## **Measures**

*Search Task:* To examine the impact of the Digital Sign Network (DSN) primes on behavior, participant honesty was measured using three indicators. These utilized both self-report metrics and behavioral indicators. The first measure replicated an indicator employed in Mazar et al. (2008) where researchers asked participants to complete a basic search task. Each was given a booklet containing 22 four-by-three matrices, with each cell containing a number between 1 and 9, to two decimal places. The task was to identify which two of the 12 numbers totaled 10 (for each matrix there was only one possible combination). Once they discovered the correct answers, participants were instructed to circle the correct answer and move on to the next matrix.

We used an adapted matrix task (Mazar et al., 2008) where participants are asked to find two whole numbers in matrix that summed to 1000. An example of the final matrix can be seen in Figure 2.



169	182	291
467	481	305
582	506	428
636	519	457

Figure 12: Example matrix

We presented participants with a booklet of 22 such matrixes. To measure participant integrity, participants were divided into two conditions: one group's performance was marked by an objective researcher (researcher marked), the other group's was self-reported (self marked). Within the objectively marked condition, participants were asked to hand in their answer book. In the self-report condition, participants were instructed to put their answer sheets into their bags or pockets, and asked to dispose of them in the building's recycling bin as they exited the building. However, before they left the building participants were asked to indicating on the consent form the total number of matrixes they correctly solved.

*Questionnaire:* Next, researchers tested participants' honesty via a self-administered morality questionnaire that we developed for the experiment. Our questionnaire consisted of 15 questions to which participants rated their level of agreement – on a five-point scale between 'strongly agree' and 'strongly disagree'. The questions probed attitudes towards various examples of workplace misconduct. The questions included: 'Using the Internet at work for personal reasons is wrong' or 'Stealing a ream of paper from work for personal use is wrong'. Answers were scored based on what is considered to be the morally correct response. A full copy of this questionnaire can be found in Appendix T.

*Pens:* The final technique used to investigate participant integrity simply involved counting the number of pens stolen from the testing lab. Researchers had provided a ballpoint pen to each participant and offered no instructions about returning it. At the end of the experiment, experimenters counted the number of pens returned with clipboards as an implicit behavioral measure of integrity.

## **Procedure**

Participants were recruited by an advert placed on the departmental intranet. The advert invited people to take part in a market research study investigating the role of packaging in shaping consumer evaluations of products.

Researchers led potential participants to a university common room (kitchen and lounge area), where the experimenter obtained consent. From the participant's perspective, the primary task was a product-packaging evaluation task, but in truth this task served as a decoy to distract attention from the seemingly generic content displayed on a DSN screen in the same room. Data from the decoy task were not analyzed.

While participants focused on the decoy task, a digital sign (32" NEC MultiSync 3120), located in the top left-hand corner of the room, displayed content. Although the screen was visible to participants, it was out of their direct line of sight (requiring a slight head turn) and thus in no obvious way part of the experiment. The DSN displayed one of two content loops (described below), and participants received

no instructions regarding it. The content of the screen comprised only visual stimuli and had no associated auditory stimuli.

Since workplace DSNs are frequently located in canteens or common areas, where distractions can complicate viewing (e.g., magazines, posters, other employees involved in conversations), we decided to place ours in a similarly open common area, where graduate students frequently congregate, make food, chat, and eat.

Participants were randomly assigned to a condition (no prime vs. integrity prime), based on a random number table. Conditions were identical, except for the content displayed on the digital sign. The DSN was designed to look as if it was part of the refurbishment of the common room and thus in both conditions it contained slides of health and safety announcements and upcoming events. (See Appendix U) However, the majority of the content (approximately 80%) displayed a Daily Quiz. It was the content of the quiz that differed between conditions. Participants were not instructed to look at the sign at any point, nor was a cover story provided for the ‘daily quiz’. However as DSNs are becoming a common site in businesses and universities, frequently displaying small aspects of trivia, we did not believe that participants would be suspicious of the content.

Researchers designed the integrity prime to decrease dishonest behavior. In the 2008 study conducted by Mazer et al., participants acted more honestly after they were asked to attempt to write down the Ten Commandments. In the current experiment, we sought to replicate this finding, by asking quiz questions of a religious or moral nature, such as: ‘Can you name the seven deadly sins?’ and ‘Can you name the twelve apostles?’ The content loop contained six questions: three with answers (presented as a follow-up to yesterday’s questions) and three without (explained as

today's questions). Of the six questions, three were designed to prime moral thinking (two without answers) and three were simply general knowledge (non-religious/morality) questions and were asked in both conditions. The structure of the questions was identical in both conditions.

The control condition contained the same three general-knowledge questions as the prime condition, plus three additional general-knowledge queries, such as 'What is the third highest mountain in the world?' These were designed to have no priming function. A screen shot is included in Appendix V.

Mazer et al. found that whether or not a specific participant could correctly name the Ten Commandments, he or she was more likely to behave well after simply attempting to do so. Mazer et al. suggest that this effect happens because mere knowledge that the Ten Commandments are a series of moral rules proves enough to elicit the relevant concepts. Following the same logic, researchers in the current study chose the priming questions to encompass a range of general knowledge regarding religion or morality. In both conditions each question was on screen for 30 seconds before moving on to the next question. Once the content loop reached the end of its cycle, it repeated. A typical screenshot from this condition is included in Appendix W.

After participants finished rating the products, they were asked to complete the two behavioral measures of honesty: the matrix-search task and the self-report questionnaire (as described above), in that order. This fixed progression was used to ensure that the questionnaire did not have any priming function on participant's attitude when completing the matrix task. Both these tasks were administered in the common room on clipboards.

The matrix task was explained to participants as an IQ test, designed to investigate whether a person's IQ influenced her or his attitude towards product packaging. Participants were led to believe that the self-report morality questionnaire was assessing their ethical stance, seeking to determine its impact on product rating.

At this point researchers instructed participants that the study was concluded and asked them to return the clipboards but no mention was made of the pens. The experimenter counted and recorded the number of pens that had been returned. Then, finally, he or she fully debriefed participants, and the true purpose of the experiment was revealed.

## **Analysis**

The following statistical analyses were conducted on each of the three measures of honesty. In order to establish if participants cheated on the matrix task, a comparison was made between the mean number of matrixes participants solve in the control group - self-mark condition against the three other conditions. To establish if this difference was statistically significant a two-way ANOVA was employed. It could be hypothesized that if there is a discrepancy between the mean numbers of matrix solved in the control group – self-mark and the three other conditions then this could be explained by participants misreporting the number of matrixes' they correctly solved.

To determine if there is a difference in answers on the self-report morality questionnaire between participants in the control condition and integrity prime

condition a t-test was conducted on participants' answers. To establish if the number of pens taken from the experiment was different after exposure to the integrity prime, because of the small numbers involved, Fisher's exact test of significance will be used.

## Results

The results shown in tables, eight and nine suggest that a DSN is capable of passively influencing participants' moral behaviors. Statistical analysis revealed that two out of the three measures demonstrated a statistical difference in behavior.

The self-report questionnaire (Table 7), designed to measure participants' honesty, consisted of fifteen items, and Cronbach's alpha for the scale was 0.863. However, an independent sample t-test revealed that there was no significant difference in the views of those exposed to the 'integrity prime' ( $M = 50.29$ ,  $SE = 2.09$ ) and 'no prime' ( $M = 46.08$ ,  $SE = 2.01$ );  $t(48) = 1.45$ ,  $p = 0.153$   $\eta = 0.04$ .

Table 6: Scores on the morality questionnaire

Integrity Primed			No Prime			df	t	p	$\eta$
M	SE	N	M	SE	N				
50.29	2.092	24	46.08	2.013	26	48	1.45	0.153	0.04

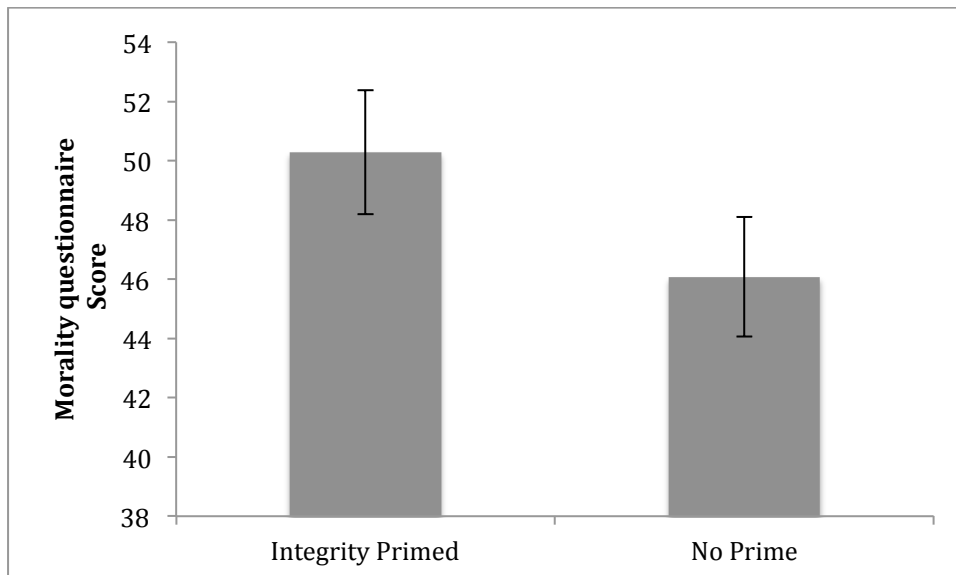


Figure 13: Mean score on the morality questionnaire by condition. Analysis indicated no significant difference between conditions. Error bars are based on standard errors of the means.

To test if there was a significant difference in the number of pens taken between the conditions, Fisher's exact test was used (see Table eight). Seven participants from the control group took a pen, whereas only one participant from the integrity primed group left with a pen. This difference is virtually statistically significant ( $p = 0.050$ , Fisher's exact test).

Table 7: Pens taken per group

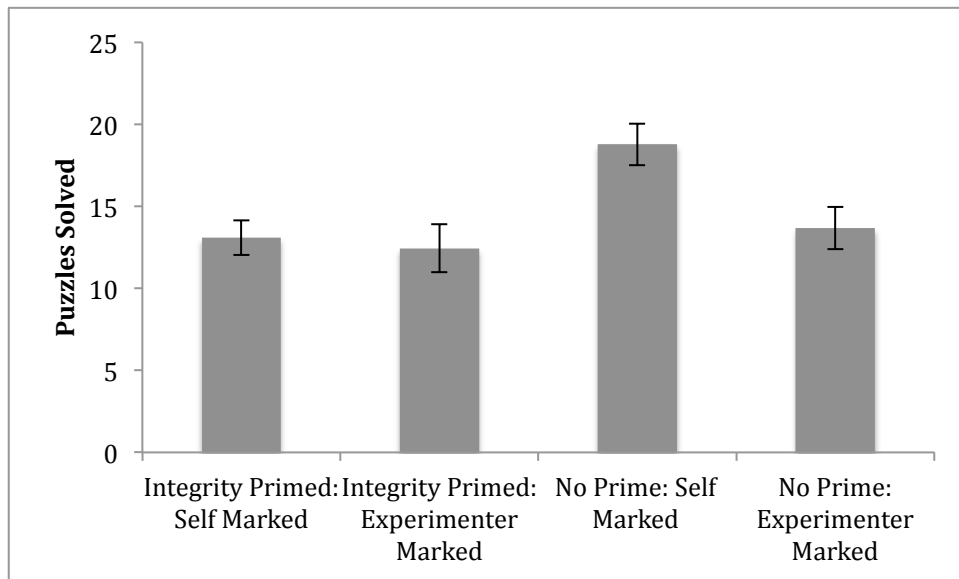
	Integrity Primed		No Prime	
	Total	N	Total	N
	1	24	7	26

To establish if participants lied about their performance on the matrix task, we analyzed the mean number of matrixes solved (Table nine) using a two-way ANOVA. The interaction effect between marking condition and prime were not significant  $F(1, 46) = 3.04, p = 0.09$ . However, there was a significant main effect for both marking condition  $F(1, 46) = 4.68, p = 0.04$ , effect size 0.128 and prime  $F(1, 46) = 6.78, p = 0.01$  effect size, 0.092. A preplanned contrast (Rosenthal & Rosnow, 1985) showed the number of matrixes "reportedly" solved in the "no prime - self marked" condition was significantly higher than in the other three conditions,  $F(1, 46) = 14.13, p < 0.001$  effect size, 0.235. The logical conclusion is that participants misreported - or lied about - the number of matrices solved.

Table 8: Number of puzzles 'solved'

	Integrity Primed			No Prime		
	M	SE	N	M	SE	N
Self Marked	13.09	1.057	11	18.79	1.272	14
Experimenter Marked	12.45	1.457	13	13.67	1.299	12





*Figure 14:* Mean number of “solved” matrices by condition. Analysis indicated that participants in the No Prime: Self marked condition claimed to have solved significantly more puzzles than participants in the other three conditions. Error bars are based on standard errors of the means.

## Discussion

The results of this study indicate that information presented passively to viewers (via a Digital Sign Network) can influence behavior. Interestingly, the priming effect appears to be stronger in this study than in Mazer's original. This difference may be attributable to several factors. First, participants in the original study were exposed to only one prime and that for only about two minutes, before moving on to the cognitively demanding matrix task. In the present study, however, participants viewed the three priming quiz questions (among three others) several times, over the course of about nine minutes, potentially leading to the stronger effect.

Although participants were not instructed to look at the DSN, they were likely attracted by its dynamic video content; according to independent research by SeeSaw Networks (2007), DSNs prove highly engaging to viewers. In addition, the simple 'quiz' format used may have intrigued viewers, who felt compelled to provide correct answers. Indeed, even after researchers fully debriefed participants, several enquired about the correct answers to the quiz questions shown.

Another factor that could have strengthened the effect is a cue participants took from the instructions on the matrix task. In the original study, participants were allowed 4 minutes to complete 20 matrices. In the present study, participants were allowed 10 minutes to solve 22 matrices; it is possible some participants believed they were expected to solve all the problems within the timeframe, and this may have led them to inflate their performance on self-report. However, there was no performance-related reward promised, the only possible motivation to inflate, lie, or cheat here is pride.

One measure was not affected by the integrity prime: the morality questionnaire. This suggests that people tend to over-predict their own moral behavior: they believe they will act in a morally correct way, but when placed in a scenario that provides the opportunity to act dishonestly, many will succumb to temptation. This appears to be another situation where self-report measures may not be an effective indicator or predictor of actual behavior.

While this study makes an important step to demonstrate how behavioral economics can be used in the workplace, criticism that can be directed at this (and other laboratory studies investigating business related phenomena) is the lack of ecological validity. Whilst we aimed to incorporate distractions -- e.g., listening to somebody else's conversation or a TV in the background -- to replicate workplace conditions, they were not controlled for. Yet we find no reason to suspect that the experiment could not be replicated in a workplace environment. The study achieved both a medium and large effect size (Cohen, 1988) suggesting the effect is robust enough to be achieved with increased occupational based distractions, although this hypothesis does need to be tested. Replication in a corporate environment might also enable researchers to quantify the duration of the effects. In both cases we successfully demonstrated that the intervention influenced the desired behavior immediately following the intervention, but further research is required to quantify the durability and specificity of the effect.

Despite this we speculate the effect is not as short-term as may initially appear. Prior studies have suggested that the effects of priming are not as short-term as that of other induction techniques (e.g., mood, see Frost and Green, 1982). However, it is uncertain how long the effect of the integrity prime would last. It is also unclear how much the effect would generalize to other situations. It could be that

a workplace prime or social norms marketing would only influence behavior in the short-term in circumstances similar to that in which employees viewed the prime. Even so, such an effect could be eminently useful. This is for two reasons; firstly if repeated and diversified, these situational effects could combine to make a substantial cumulative difference to organizational performance. Secondly, although it is possible that the effect is contained to the one environment in which the prime is viewed, because businesses know where the offence takes place, the DSN could be installed in the office where it could be an effective communication device as well as a technique to reduce undesirable behavior. Finally, the use of a DSN could have a greater impact than first appears. If by using a simple and cost-effective technique it could reduce minor employee theft, it could 'nip in the bud' theft escalation and transform petty theft norms. If employers tackle low-level crime via priming, they then prevent escalation and use the conformity effect to create a positive, crime-free work environment.

## **Managerial Implications and Conclusions**

While behavioral economics interventions have become popular with governments across the world (John, Smith, & Stoker, 2009) it has been more or less neglected as a technique to improve organizational profitability. Yet this study provides initial evidence to suggest that passive priming can positively influence employee's behavior. More excitingly for organizations this interventions did not require any redesign of working procedure but simply the installation of a DSN. For those organizations that have already installed such a system it is just a case of developing new content for the screens that can be done almost instantly without incurring any new costs. However, one factor that we suspect led to the successful engagement with the sign is the quiz format used. Quizzes have widespread appeal across a diverse range of demographics, yet in order to attract employee's attention the questions need to be aimed at the right difficulty level and on a topic that is of interest to the employees. Consequently, care in the development of the questions and the way they are presented is important to ensure successful engagement.

For those organizations that do not have such a network in place, we would not expect (nor do we suspect it would be effective) if the screens only contained information regarding the prime. Consequently, the screens could be used as a new communication channel as an alternative to e-mail providing a secondary benefit to the network.

We acknowledge that one limitation of the second study is the nature of the primes used; some business leaders may fear that use of any primes related to religion will make them appear to be promoting a single religious viewpoint. Further research

might diversify moral content, including references to other holy texts, or the lives of moral leaders such as Martin Luther King Jr., or Nelson Mandela.

Further research should be conducted to establish whether other moral content could produce a similar effect. For example, researchers could design primes to:

- Increase employee pride in the organization (see, Vance, 2006)
- Demonstrate the link between actions over time - how poor organizational performance can influence society.

Although there are a number of questions that still remain unanswered, this study marks a positive step forward in the battle against cyber loafing and employee crime. This technique now needs refining and replicating within a corporate environment before a more definite conclusion can be reached regarding their application within the workplace setting.

## General Discussion

These experiments show strong evidence that techniques from behavioral economics can be used to positively improve business performance in a (simulated) workplace environment. We have explored a range of diverse techniques (e.g. posters, music, digital signs, etc.) they all demonstrate how important it is for managers to understand how the environment can influence behavior. This research emphasizes the importance of understanding how small changes can influence both task performance and employees' subjective experience and perceptions of tasks.

For example, our research demonstrates that exposing participants to motivational posters improves their positive affect and that listening to music while completing a task causes participants to claim that the task became more enjoyable. Employers need to accept that employees are human and have emotions. If an employee is unhappy or finds their job boring, there is a high probability they will eventually leave, incurring a substantial cost for the organization.

Although several of our manipulations improved participant mood, we failed to find any direct relationship between mood and performance. Despite this, clear evidence was found suggesting that the use of techniques advocated by behavioral economics (e.g. priming and social norms) can successfully be used in a workplace context to tackle specific problems, with the chance for businesses to make large savings. Yet despite the financial potential, many managers may feel uncomfortable employing such techniques believing them to be unethical or manipulative. For example, Bovens (2009) questioned whether there is really a difference between 'nudging' consumers and subliminal advertising.

Subliminal advertising and nudging are very different. Subliminal advertising is a technique by which consumers are exposed to marketing related stimuli without consciously being aware they are viewing the stimuli (Trappey, 1996). Yet despite consumers being unaware that they have been exposed to an advert, it may change their behavior so that they purchase more of the advertised product. While the effectiveness of subliminal advertising has now been discredited within the academic literature (Broyles, 2006; Saegert, 1987; Trappey, 1996). Bovens (2009) argues that the crucial difference between nudging and subliminal advertising depends on the degree of transparency of the intervention. If an organization uses subliminal advertising they are deliberately attempting to: influence potential consumers without them being aware, resulting in them engaging in behavior they would not normally participate in.

Yet nudging is fundamentally different: when nudges are employed participants are not manipulated to engage in an activity against their will. In all cases the nudge simply activates beliefs and assumptions that participants already have, making them more salient at the point of decision-making. This results in them giving a greater weighting to certain factors. If an employee was genuinely set on stealing from work or engaged in cyber loafing, no nudge based intervention would prevent them from doing so. Employees can easily identify and ignore and nudge based interventions. Now if we assumed that subliminal advertising could actually change preferences and a subliminal imagery was shown throughout the workplace, employees would find it far hard to ignore the intervention as it is invisible and consequently impossible to monitor (Bovens, 2009).

While there is a technical difference between subliminal advertising and nudging, employees may not always perceive it as such. While collecting data, a



number of participants withdrew from experiments, citing moral objections to the study. Speaking to these participants afterwards, they explained that in their opinion, this research would help organizations exploit their employees further. Although these techniques do not circumvent an employee's freewill, the fact they are informed by psychological research may lead employees to perceive that employers are attempting to 'brainwash' them. The thought that these techniques could be reported in a newspaper like the 'Daily Mail' or 'The Sun' under the headline 'Brainwashing' or 'Manipulating' could cause some serious public relation issues for a company. The fact there is a conceptual difference between influence and manipulation is irrelevant. From a marketing perspective what is important is not what actually occurs, but what is perceived to have occurred.

While managers may be reluctant to try and influence employees using psychological tactics, their actions will always influence employee's actions, either directly or indirectly. A key to being a successful manager is the ability to inspire employees, so that they follow their instructions (Bass, 1990). Although some leaders possess characteristics which increase the likelihood that subordinates will follow them (often referred to as charismatic leaders – e.g. Shackleton or Hillary), other people learn which procedures are most successful at influencing employees through a process of trial and error. The difference in using techniques that come from research is that managers do not have to find out the hard way what works and what does not.

Other managers may be cautious about using these techniques because although they are relatively unknown at the moment, if employees became aware of them, they could imagine that the success of these interventions will diminish. Yet this does not appear to be the case as Wansink, Van Ittersum, and Painter (2006)

demonstrated that even professors, researchers, and PhD students who study how ambient cues influence behavior, were just as susceptible to behavioral economic intervention as non experts.

The other fear that managers have about behavioral economic interventions is that once employees realize managers are using an intervention, they perceive that managers are attempting to control them and they may react negatively. However, we do not think that employees will react this way. This is because although the techniques we have discussed have the potential to be used for unethical purposes (e.g. advertising the sale of cigarettes) all of the interventions we have developed (decreasing cyber loafing, decreasing employee theft, increasing employee mood, etc.) are not attempting to encourage employees to undertake any activity in which they would not normally participate.

However, as noted earlier, before we can say with certainty that the results of these techniques can be generalized to a workplace context, further research needs to be conducted with these interventions tested in the real world. Laboratory studies are a valid technique to explore new phenomenon, but care should be taken in generalizing behavioral economic findings, especially interventions that depend on priming and social norms. Laboratory studies enable experimenters to perfectly control the environment so that participants are not exposed to any background distractions. This causes participants to be only exposed to the intended prime or social norm. In the real world, the workplace is full of distractors, many of which are capable of have a priming effect. For example, a colleague could be wearing a new outfit and this could prime employees to think about money, or they could still be thinking about a newspaper headline they read while on their way into work. Either of

these factors could be more salient in an employee's mind than the corporate prime or social norm message.

The second crucial difference in a laboratory setting and the real world is the difference in time between exposures to the independent variable and the dependent variable. In all of our experiments participants were exposed to the independent variable and then immediately asked to complete the test of the dependent variable. In the workplace, the situation is fundamentally different. Employees may be exposed to the social norm, prime or poster in a common room or corridor; however the targeted behavior can easily take place in a different office an hour or two later. To date, no research has looked to establish the duration of effects like those studied here.

Not only would replicating the study in an ecologically valid environment allow us to understand the duration of the effect, but it would also help us understand what role context plays in priming and behavior change. Currently, the majority of studies which investigate priming are conducted within a laboratory context where participants are exposed to the prime in the same room as the primed behavior is quantified (e.g. Randolph-Seng & Nielsen, 2007). In one of the few studies whereby participants were exposed to the prime in a different room to which the rest of the experiment was conducted, Bainbridge, Lewandowsky and Kirsner (1993) concluded that the priming effect is either eliminated completely or significantly reduced when the context is altered. However, as our intervention is designed to be used in a workplace setting, it would be important to establish what context means in the workplace. We envisage that in a workplace setting managers would want the digital signs to be located in a staff canteen or a common room so that it is not a distraction while staff work. However, based on Bainbridge et al.'s research it is unclear if this would be classed as the same context or not. Employees may perceive the staff

canteen and their desk to be part of the same context (at work) and so the effect could still transfer over. However, this hypothesis will need to be tested as currently no data provides a clear suggestion.

This situation is complicated further when we try and understand the role that context plays on messages that use social norms to change behavior. Unlike Bainbridge et al.'s study which showed that by changing the context the effect of priming is nullified, numerous studies demonstrate that the effects of social norms are capable of influencing behavior even when the participant is in a different context to where they viewed the original message (Martin, Bassi, & Dunbar-Rees, 2012). Currently, it is unclear if these two findings related. Since the publication of Cialdini's book 'Influence: The Psychology of Persuasion' (1993) and more recently, Thaler and Sunstein's book 'Nudge: Improving decisions about health, wealth and happiness' (2008) the concept of social norming has become relatively well known and it appears that these tactics have started to become popular tactics in interventions designed to change consumers behavior (Corner, 2011) and it may be a case that more studies have investigated the impact of context on social norms than priming.

However, it is important to note that by changing the context of our experiment, may actually help to strengthen the effect. This is because all of our participants in our experiments were undergraduate psychology students. Although we tried to ensure that no students who participated in our studies had studied the mechanism we were using. It is conceivable that a number of participants had completed background reading within consumer psychology and were familiar with the mechanisms being used which could have changed the interventions effectiveness. Even if the participant were unaware of the mechanism we were using, all participants were aware that they were engaged in an experiment whereby the experimenters were

attempting to manipulate their behavior. Consequently, they could have been very skeptical of any unusual stimuli, including the DSN. In a workplace context, employees are less likely to be suspicious that the environment is going to change their behavior. Consequently, by testing the experiment in a field setting where participants are unaware that they are undertaking an experiment, it could be suggested that a larger effect size could be detected.

A second benefit of repeating out experiments in a field setting is the fact that this would help remove any experimenter bias and allow us to achieve a significantly larger sample size. Laboratory experiments are frequently criticized for their small sample size in comparison to data collected using quasi-experimental or questionnaire based methods. While this initially appears to reduce the validity of the study and may reduce the ability to generalize the findings, this is not the case. Laboratory studies enable experimenters to carefully control all of the variables, reducing the variances in participant's responses. Consequently statistical significance can be achieved with relatively small sample sizes. This has been shown in previous laboratory studies within organizational psychology, that frequently utilize sample sizes of twenty or fewer per condition (e.g. Du Budescu, Shelly and Omer, 2011, 20 participants; Fischer, Lea, and Kastenmüller, 2010, 14 participants; Podsakoff and Farh, 1989, 18 participants). However, although our sample size does not compromise the reliability of our findings, a larger sample size would give the research more face validity, which would be useful in convincing managers to adopt or try out these new tactics.

Yet despite the limitations associated with laboratory-based research, when all of our studies are viewed collectively, they provide strong evidence that digital signs and environmental cues can influence employees in corporate contexts. The advantage of using digital signs is that they allow employers a dynamic

communication channel so that they can adopt the message and the intervention so that it reflects the current business needs.

Collectively these findings have direct practical implications for businesses. Atmospherics in the corporate environment offer businesses the opportunity to achieve substantial savings and improve operational efficiencies. Kotler (1973:64) observed “*atmospheres are a factor present in every buying situation*” and the same is true in a corporate environment. Whether the business is a large multinational corporation or an SME, environmental cues will be present and they can shape employee behavior. Historically managers have not thought about how such cues shape employee behavior (except in terms of time and motion studies) and consequently the corporate environment has evolved in an organic manner, shaped by employee’s desires and manager’s instincts. Rather than managers thinking about how the environment influences employee’s behavior.

In the future, we can foresee atmospherics being used as a form of competitive advantage for businesses. As existing competitive advantage are being eroded as many businesses benefit from technological innovations and lower costs (as production shifts to LEDCs) we predict that environmental cues will be an important differential advantage improving an organizations overall profitability.

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## **Part E: Appendices**

**Appendix A: Example Motivational Poster**



**EXCELLENCE**

*"Climb as high as you can dream"*

**Appendix B: Example Parodic Poster**



**FINANCIAL PLANNING**

*“Long term: the car is cheaper”*

**Appendix C: Example Control Poster****SNOW**

*“is a type of precipitation in the form of crystallised water ice, consisting of a multitude of snowflakes that fall from clouds.*”



### Appendix D: PANAS Scale

This questionnaire contains 20 statements.

Describe yourself as you generally are now, not as you wish to be in the future.

For each statement choose the response that best represents yourself and your opinion:

- Strongly Agree: If you strongly agree or if the statement is definitely true.
- Agree: If you agree or if the statement is mostly true.
- Neutral: If you are neutral about the statement, if you cannot decide, or if the statement is about equally true and false.
- Disagree: If you disagree or if the statement is mostly false.
- Strongly Disagree: If you strongly disagree or if the statement is definitely false.

Try not to use the 'Neutral' option too often.

Please rate the extent to which you feel NOW on a 5 point scale where:

1	2	3	4	5
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

To what extent do you NOW feel:

Afraid	Ashamed	Enthusiastic
Scared	Upset	Exited
Nervous	Distressed	Inspired
Jittery	Active	Interested
Irritable	Alert	Proud
Hostile	Attentive	Strong
Guilty	Determined	

### Appendix E: Data Inputting Task

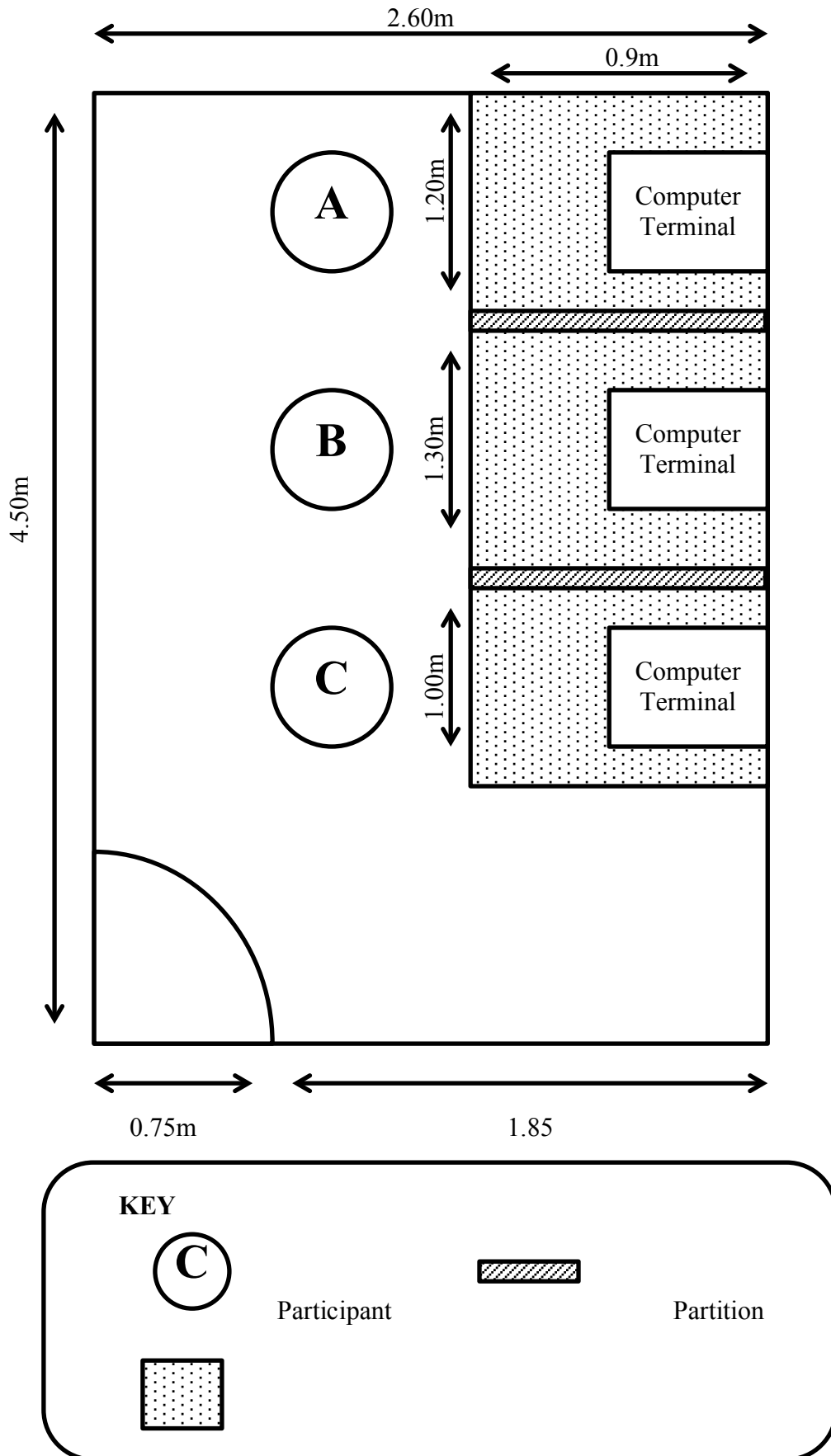
ID Value	Title	First Name	Surname	1st line Address	2nd line Address	Post Code	Age
1	Mr.	Gareth	Jenkins	10 Guild Street	London	EC4P 6NB	21
2	Miss.	Joanne	Kearney	18 Park Place	Castle Heaton	TD12 4YA	32
3	Mr.	Valdemarr	Wagner	Brandenburgische Str 50	Odenbach	67748	25
4	Mr.	Joshua	Jones	14 Park Place	Castle Cary	BA7 9JP	89
5	Mrs	Keira	Williams	64 Horsefair Green	Onecote	ST13 8IY	36
6	Mr.	Chris	Fontana	47 Bishopthorpe Road	Penistone	S30 1AX	34
7	Miss	Orlantha	Maier	Hochstrasse 86	Bredstedt	25817	32
8	Mrs.	Ffion	Powell	54 Whatlington Road	Cotham	BS6 2CQ	31
9	Mrs.	Beverly	Chapman	70 Great Western Road	Longdon	WS15 0EW	75
10	Miss	Maureen	Gless	Jenaer Strasse 95	Essen	45279	25
11	Miss	Kirsty	Milne	6 Pier Road	Stanmer	BN1 6OG	63
12	Miss	Angharad	Parker	37 Osborne Road	Kingcoed	NP5 1EG	68
13	Miss	Lauren	Lake	42 Preston Rd	Morley	DL14 0IP	28
14	Mrs	Erin	Barnes	14 Bullwood Rd	St Boswells	TD6 8MU	35
15	Mr.	Mark	Poote	44 Winchester Rd	Merrifield	TQ7 7LX	21
16	Mrs	Megan	Moore	38 Bridge Street	Goonbell	TR5 6NK	43
17	Mrs.	Tanya	Aldred	90 Main Rd	Fordcombe	TN3 3PM	71
18	Mrs.	Lucy	Bassett	98 Castledore Road	Tulloch	IV24 4WX	66
19	Mr.	Jacob	Lewis	90 Petworth Rd	Dunshelt	KY14 7RQ	26
20	Mr.	Ludovic	Bagman	54 Southern Way	North Stainmore	CA17 1YT	38
21	Mrs	Hannah	Kerr	48 Henley Road	Boyton	IP12 0PP	54
22	Mrs	Jessica	Bell	26 Stone Cellar Road	Kingston Near Lewes	BN7 0KA	21
23	Mrs	Mia	Kelly	76 Traill Street	Rookwith	HG4 3FO	54
24	Mrs	Lily	Mitchell	11 Exning Road	Hardenhuish	SN14 4KT	65
25	Miss	Elizabeth	Siebler	74 Nenthead Road	High Salvington	BN14 9TB	65
26	Miss	Vicki	McQue	91 Asfordby Rd	Airdrie	KY10 8RB	75
27	Miss	Smidge	Lane	33 Farburn Terrace	Little Hale	NG34 9GL	22
28	Mr.	Neil	Cook	99 Overton Circle	Little Warley	CM13 7JM	45
29	Miss	Alyson	Schwarze	Alt-Moabit 82	Brandenburg	14734	43
30	Mr.	Matthew	Bucher	22 Eddy Lane	Chickering	KA27 8LY	26

### Appendix F :Data inputting task Screen shot

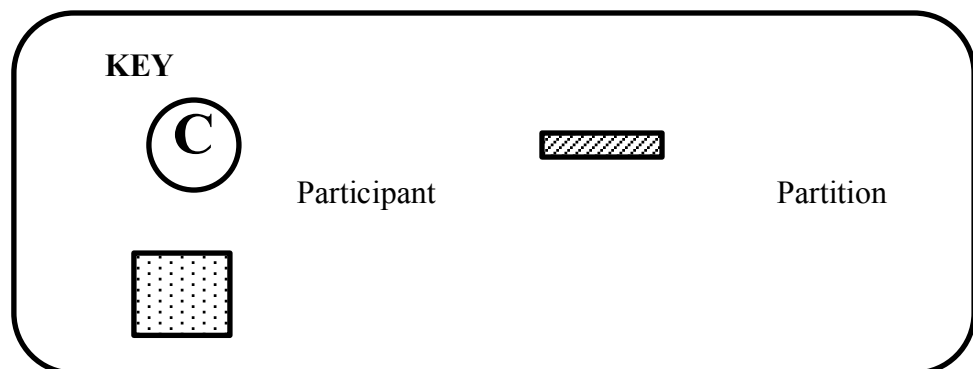
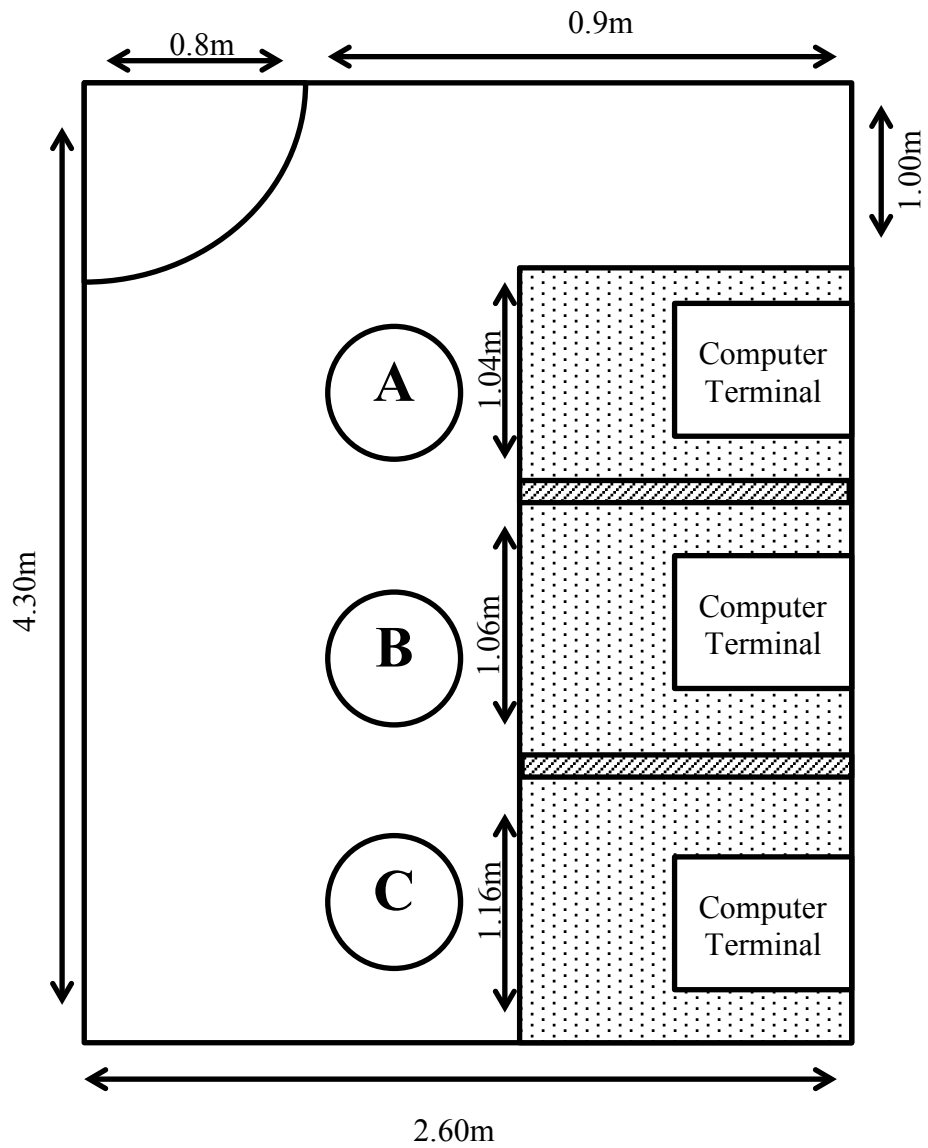
The screenshot shows a window titled "UserForm1" with a close button in the top right corner. The main content area has a title bar that says "Please enter data for Record: 1". On the left side, there is a small icon of a person. The form contains the following fields and controls:

- Id Code**: A text input field.
- Title**: A dropdown menu.
- Forename**: A text input field.
- Surname**: A text input field.
- Address 1**: A text input field.
- Address 2**: A text input field.
- Postcode**: A text input field.
- Age**: A text input field.
- OK**: A button located at the bottom right of the form.

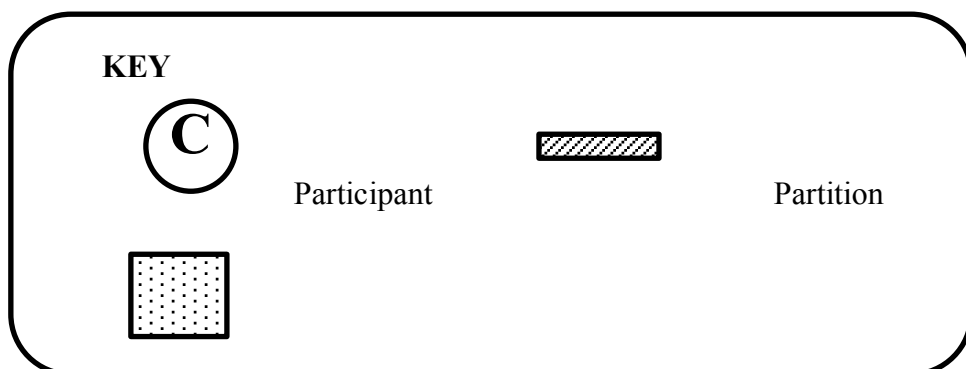
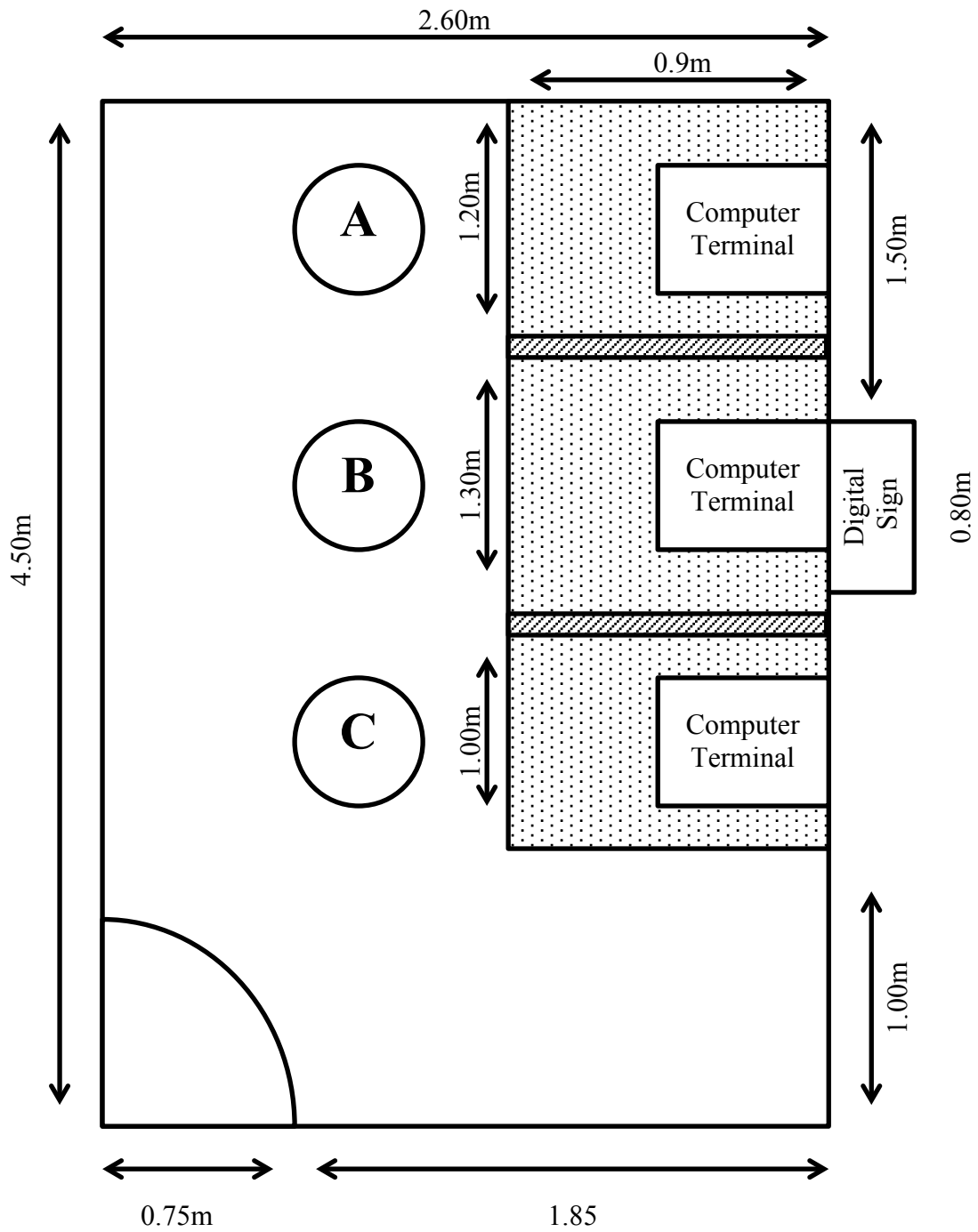
### Appendix G: Testing Room One



**Appendix H: Testing Room Two**



**Appendix I: Testing Room One (With the Digital Sign Installed)**



**Appendix J: Example Urban Scene**



Gareth J. Harvey

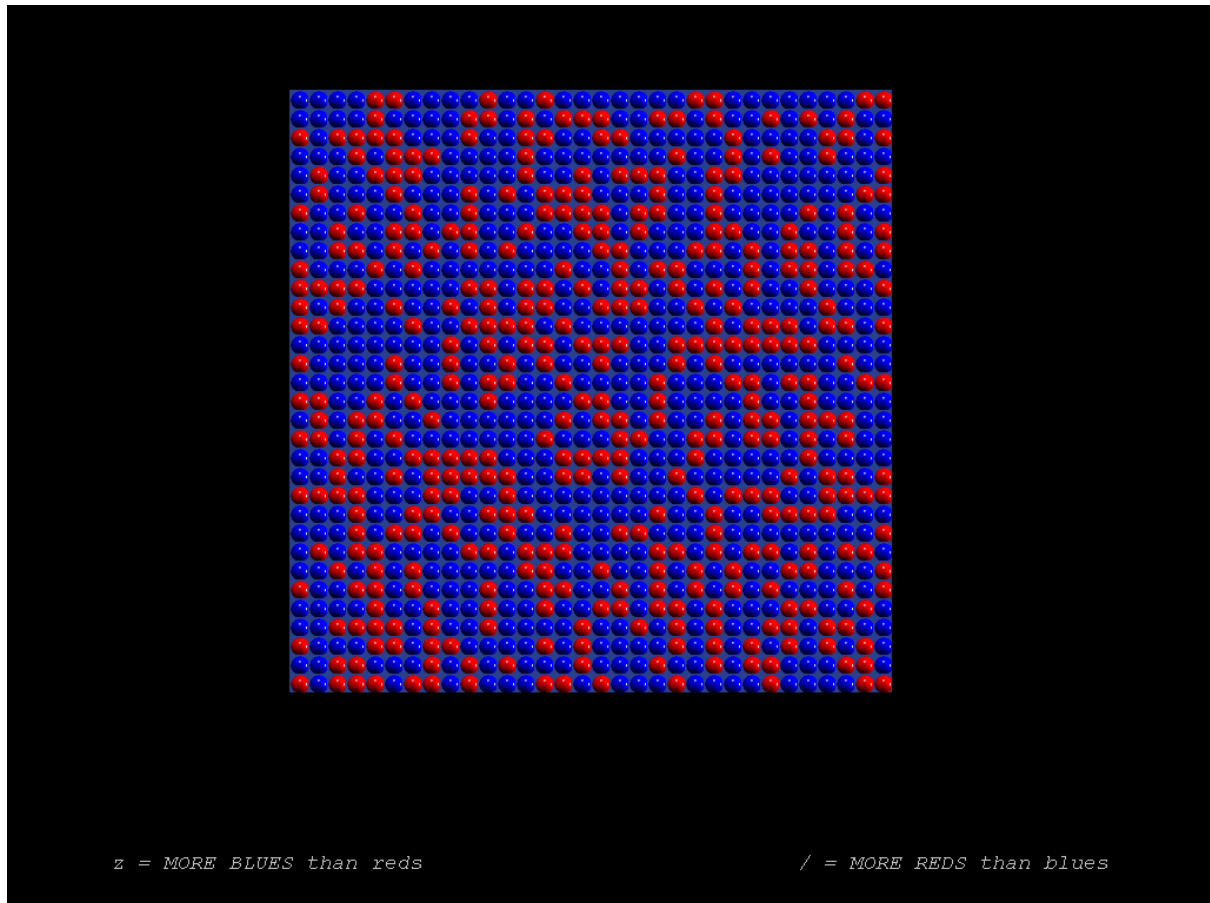


**Appendix K: Example Rural Scene**



Gareth J. Harvey



**Appendix L: Screen Shot of the Fatigue Task**

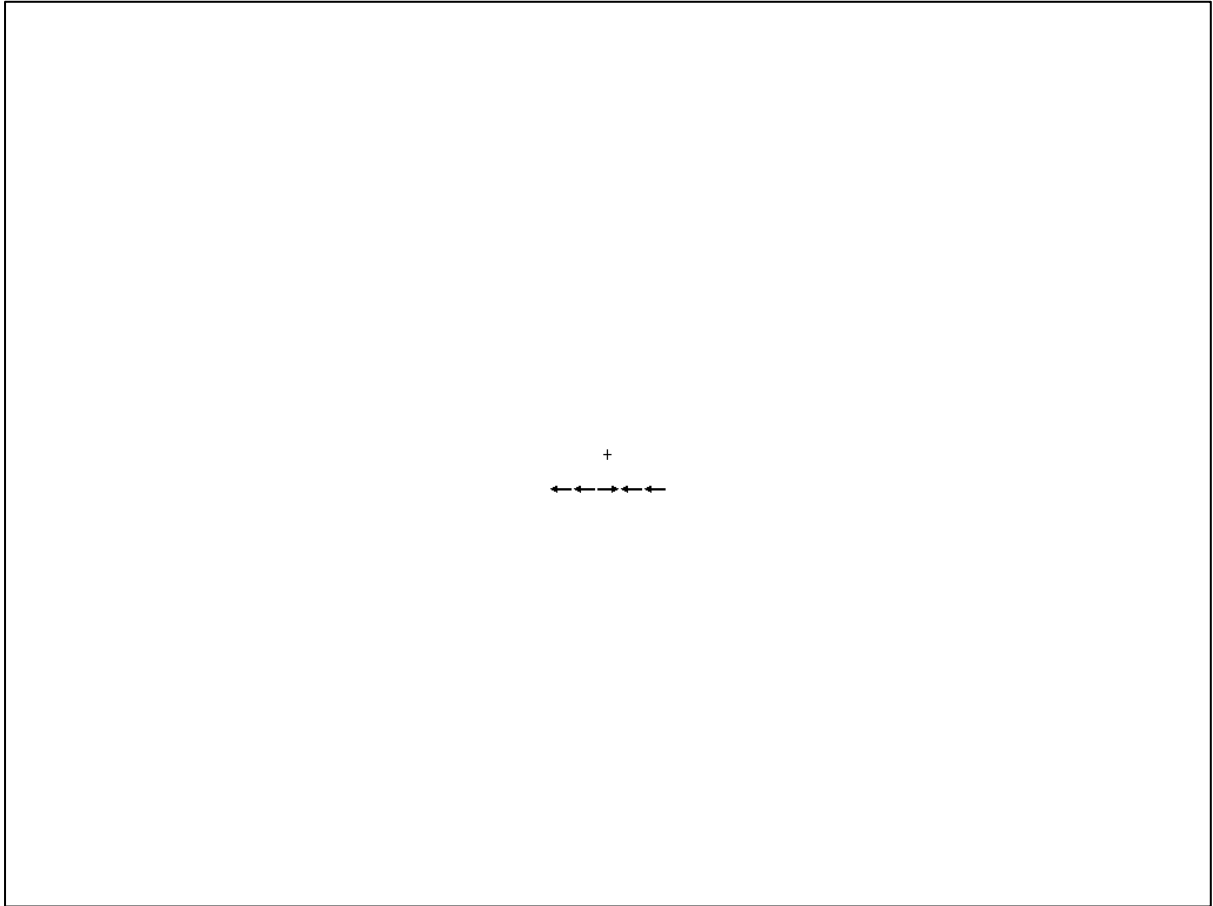
### Appendix M: Pines And Aronson (1988) Burnout Measure

This questionnaire contains twenty-one statements.

Please rate to which degree does each of these statements describe your current mood

1	2	3	4	5	6	7
Never	Once in a great while	Rarely	Sometimes	Often	Usually	Always

1. Being tired
2. Feeling depressed
3. Having a good day
4. Being physically exhausted
5. Being emotionally exhausted
6. Being happy
7. Being "wiped out"
8. "Can't take it anymore"
9. Being unhappy
10. Feeling run-down
11. Feeling trapped
12. Feeling worthless
13. Being weary
14. Being troubled
15. Feeling disillusioned and resentful
16. Being weak and susceptible to illness
17. Feeling hopeless
18. Feeling rejected
19. Feeling optimistic
20. Feeling energetic
21. Feeling anxious

**Appendix N: Screen Shot from the ANT Task**

+

←←→→←←

### Appendix O: Product Rating Task

#### Sample Product Packaging



**Appendix P: Product Rating Questionnaire**

**1. How often do you eat sweets or chocolate?**

- Daily       Every other day   
 Twice a week       Once a week   
 Less than once a week       I Don't eat chocolate

**2. How long since you last ate anything? \_\_\_\_\_ hours**

**3. Currently how hungry are you? (Please circle)**

Very hungry      Quite hungry      Not really hungry      Not Hungry at all

**4. Please rate the products on screen using the following dimensions**

- Appearance      1 = unattractive      7 = Very Attractive  
 Quality      1 = low quality      7 = High quality  
 Cost      1 = cheap      7 = Expensive  
 Eye-catching      1 = very subtle      7 = Very eye catching  
 Likelihood to give as a gift      1 = highly unlikely      7 = Very Likely

**Easter Eggs**

	Appearance	Quality	Cost	Eye catching	Likelihood to give as a gift
Product 1					
Product 2					
Product 3					
Product 4					

**Chocolate**


	<b>Appearance</b>	<b>Quality</b>	<b>Cost</b>	<b>Eye catching</b>	<b>Likelihood to give as a gift</b>
Product 1					
Product 2					
Product 3					
Product 4					

**Whisky**

	<b>Appearance</b>	<b>Quality</b>	<b>Cost</b>	<b>Eye catching</b>	<b>Likelihood to give as a gift</b>
Product 1					
Product 2					
Product 3					
Product 4					


**Appendix Q: Screen Shot of the Digital Sign Content from the Social Norming  
Study**

**Screen shot of the DSN from the High Facebook Usage Condition**



**The average Student ....**

- **Spends 9.2 hours a week on facebook**
- **Spends 40% of there time on non related internet sites when asked to complete another task.**



A screenshot of a digital sign (DSN) for Facebook. The background is a faded image of a large, historic stone building with a central tower. The Facebook logo is prominently displayed at the top. Below it, the text reads 'The average Student ....' followed by two bullet points: 'Spends 9.2 hours a week on facebook' and 'Spends 40% of there time on non related internet sites when asked to complete another task.' In the bottom right corner, there is a small image of a computer monitor and keyboard.

**Screen shot of the DSN from the Average Facebook Usage Condition.**



**The average Student ....**

- **Spends 1.1 hours a week on facebook**
- **Spends 7% of there time on non related internet sites when asked to complete another task.**



A screenshot of a digital sign (DSN) for Facebook, similar to the one above but with different statistics. The background is the same faded image of a historic building. The Facebook logo is at the top. The text reads 'The average Student ....' followed by two bullet points: 'Spends 1.1 hours a week on facebook' and 'Spends 7% of there time on non related internet sites when asked to complete another task.' In the bottom right corner, there is a small image of a computer monitor and keyboard.

**Appendix R: Mock UK Citizenship Test**

Please circle the answer you think is correct.

**1. *Women in Britain first got the vote in:***

- a) 1882
- b) 1918
- c) 1928
- d) 1945

**2. *Jewish people came to Britain from Poland, Ukraine and Belarus to escape racist attacks***

- a) From 1830 to 1850
- b) From 1880 to 1910
- c) From 1910 to 1920
- d) From 1930 to 1945

**3. *The initials GCSE stand for:***

- a) Graduate Certificate of Secondary Education
- b) General Certificate of Special Education
- c) General Certificate of Secondary Education
- d) Grade certificate of School Education

**4. *The Irish Famine was in the middle of the:***

- a) 1820s
- b) 1830s
- c) 1840s
- d) 1850s

**5. *By what percentage is the average hourly pay of women lower than men's?***

- a) 5%
- b) 10%
- c) 15%
- d) 20%



**6. *The head of the Church of England is:***

- a) The Archbishop of Canterbury
- b) The Prime Minister
- c) The Queen
- d) The Moderator

**7. *Is the following statement true or false?***

*‘The monarch of the UK is not allowed to marry anyone who is not protestant’*

- a) True
- b) False

**8. *The number of Bank Holidays every year is?***

- a) 2
- b) 3
- c) 4
- d) 5

**9. *Gaelic is spoken in which TWO countries in the UK?***

- a) England
- b) Wales
- c) Scotland
- d) Northern Ireland

**10. *In which two places does the European Parliament meet?***

- a) Strasburg
- b) Paris
- c) Schiphol
- d) Brussels

**11. *How many Parliamentary constituencies are there?***

- a) 464
- b) 564
- c) 646
- d) 664

**12. How many countries are there in the EU?**

- a) 6
- b) 15
- c) 25
- d) 27

**13. The group of senior MPs appointed by the leader of the Opposition to lead the criticism of government is called:**

- a) The Opposition Cabinet
- b) The Shadow Ministers
- c) The Shadow Cabinet
- d) The Opposition Ministers

**14. Young people from families with low income can get financial help with their studies when they leave school at 16. This help is called:**

- a) Education support grant
- b) Further learning and training support allowance
- c) Education maintenance allowance
- d) Post 16-education allowance

**15. The minimum wage in the UK for workers aged 22 and above is:**

- a) £4.95
- b) £5.15
- c) £5.35
- d) £5.93

**16. National Insurance contributions are used to help pay for which TWO of the following benefits:**

- a) State libraries
- b) National Health Service
- c) Universities
- d) State Retirement Pension

**17. Which TWO jobs from the following list are children aged under 16 not allowed to do?**

- a) Sell alcohol, Cigarettes or medicines
- b) Deliver newspapers
- c) Work in a kitchen

- d) Causal gardening

**18. Is the statement below True or false?**

*'Any child under-school leaving age (16) seeking to do paid work must apply for a licence from the local authority'*

- a) True
- b) False

**19. Schools must be open:**

- a) 150 days a year
- b) 170 days a year
- c) 190 days a year
- d) 200 days a year

**20. Prime Minister's Questions take place**

- a) Every day when parliament is sitting
- b) Every week when parliament is sitting
- c) Every fortnight when parliament is sitting
- d) Once per month when parliament is sitting

**21. How many seats does the UK hold in the European Parliament?**

- a) 58
- b) 68
- c) 78
- d) 88

**22. You can receive health advice and treatment when you are pregnant and after you have had the baby from which TWO sources?**

- a) Your GP
- b) The family planning association
- c) Your health visitor
- d) Your local nursery

**23. Why should you use a solicitor when buying a property?**

- a) They check the property is structurally sound

- b) They carry out legal checks on the property, the seller and the local area
- c) They negotiate the repayment terms of your mortgage with the bank or building society
- d) They act on behalf of both buyer and seller

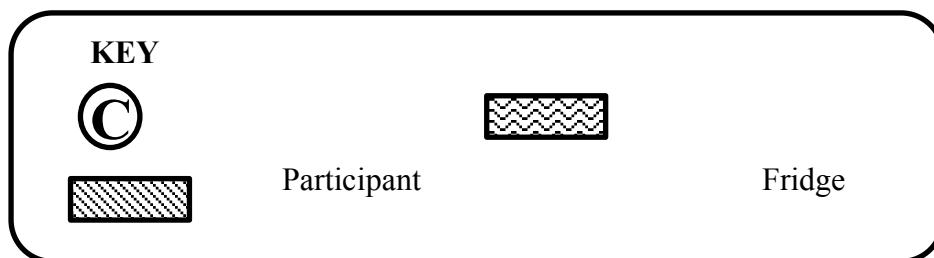
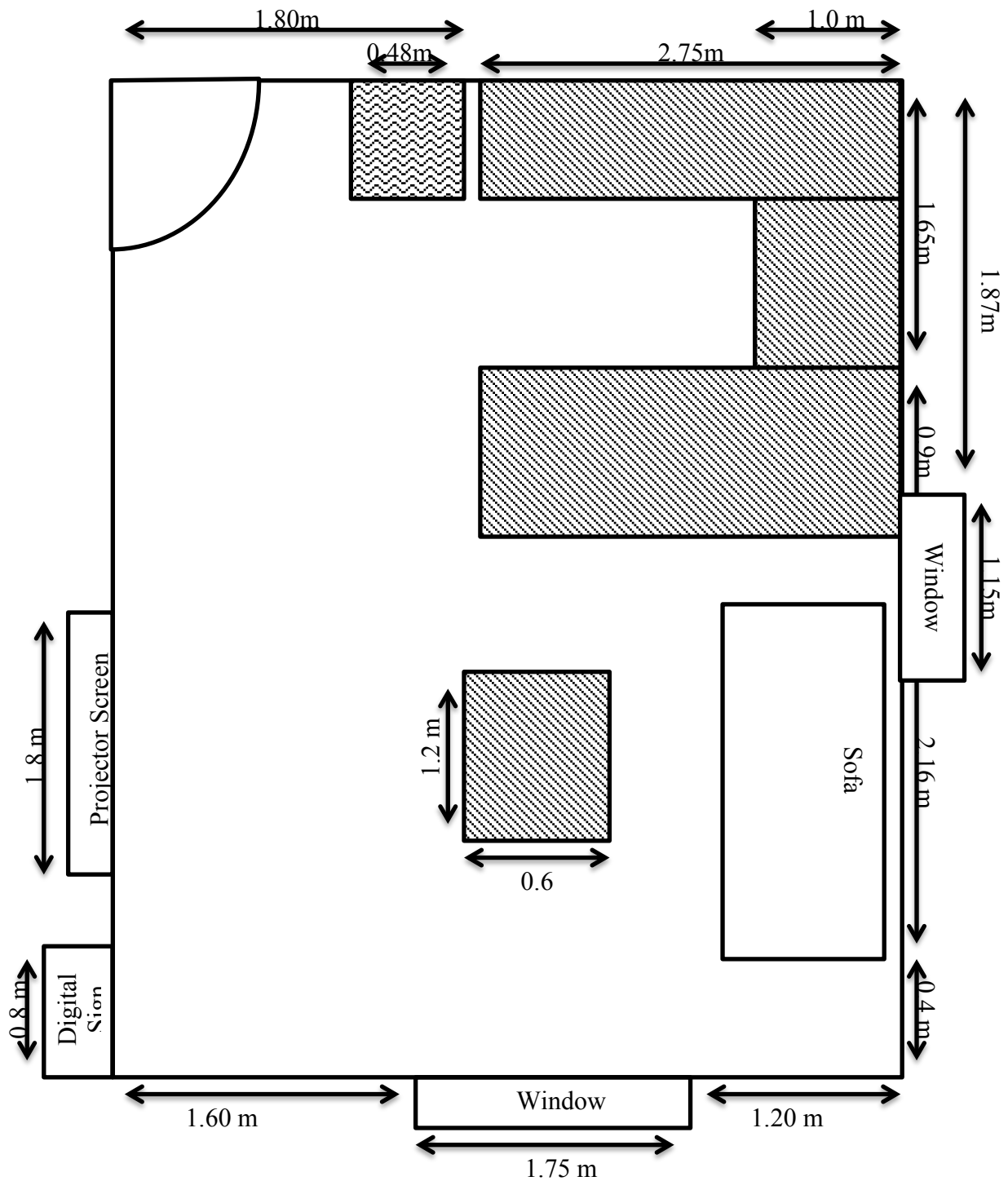
**24. Which TWO of the following can vote in all UK public elections?**

- a) Citizens of the Irish Republic resident in the UK
- b) Citizens of EU resident in the UK
- c) Citizens of the commonwealth resident in the UK
- d) Anyone resident in the UK

**25. Which TWO of these are names for the Church of England?**

- a) Methodist
- b) Episcopal
- c) Anglican
- d) Presbyterian

**Appendix S: The layout of the common room**



## Appendix T: Morality Questions

For the following statements please circle the description that matches your view most closely.

**1. Is it right for a parent to steal a loaf of bread to feed their starving child:**

Strongly agree (5)    Agree (4)    Undecided (3)    Disagree (2)    Strongly disagree (1)

**2. If I thought I could 'get away' with passing someone else's ideas as my own in an essay I would:**

Strongly agree (5)    Agree (4)    Undecided (3)    Disagree (2)    Strongly disagree (1)

**3. I think it is acceptable to buy someone shots to increase my chances of 'pulling':**

Strongly agree (5)    Agree (4)    Undecided (3)    Disagree (2)    Strongly disagree (1)

**4. Stealing a realm of paper from work for personal use is wrong:**

Strongly agree (5)    Agree (4)    Undecided (3)    Disagree (2)    Strongly disagree (1)

**5. Using a phone at work to make long distinct personal phone calls is acceptable:**

Strongly agree (5)    Agree (4)    Undecided (3)    Disagree (2)    Strongly disagree (1)

**6. Using the Internet at work for personal reasons is wrong:**

Strongly agree (5)    Agree (4)    Undecided (3)    Disagree (2)    Strongly disagree (1)

**7. Photocopy 50 pages from a textbook is acceptable, even though it is illegal:**

Strongly agree (5)    Agree (4)    Undecided (3)    Disagree (2)    Strongly disagree (1)

**8. Lying on a CV to increases your chances of getting a job is wrong:**

Strongly agree (5)    Agree (4)    Undecided (3)    Disagree (2)    Strongly disagree (1)

**9. If I saw somebody who I do not know, drop a £5 note on the floor I would try and give it back to them:**

Strongly agree (5)    Agree (4)    Undecided (3)    Disagree (2)    Strongly disagree (1)

**10. Is it acceptable to download music and films from illegal file sharing websites:**

Strongly agree (5)    Agree (4)    Undecided (3)    Disagree (2)    Strongly disagree (1)

**11. I would abandon a friend with a group of people he/she didn't know if somebody I was interested in asked me to join them for drinks:**

Strongly agree (5)    Agree (4)    Undecided (3)    Disagree (2)    Strongly disagree (1)

**12. Is I could get away with it I would ride on a bus/train without buying a ticket:**

Strongly agree (5)    Agree (4)    Undecided (3)    Disagree (2)    Strongly disagree (1)

**13. If an ATM gives you an extra £20 is it acceptable to keep the money without reporting it:**

Strongly agree (5)    Agree (4)    Undecided (3)    Disagree (2)    Strongly disagree (1)

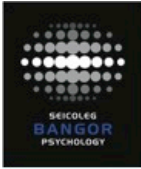
**14. It is wrong to claim a catch in a game of cricket/rounders unless you are 100% sure you took the catch cleanly:**

Strongly agree (5)    Agree (4)    Undecided (3)    Disagree (2)    Strongly disagree (1)

**15. It is wrong to copy a CD a friend has leant you:**


Strongly agree (5)    Agree (4)    Undecided (3)    Disagree (2)    Strongly disagree (1)

## Appendix U: Generic Digital Sign Content



# Lloyd Building Notices

- Fire alarm testing - Every Friday 6 pm
- Fire exist - NOT to be used except in emergencies.
- Please keep corridors clear of obstructions





**Appendix V: Screen Shot from the Digital Sign in the Control Condition**The image is a screenshot of a digital sign. In the top left corner, there is a black square logo with a grid of white dots and the text "SCHOOL OF BANGOR PSYCHOLOGY". The main background of the sign is a photograph of a large, ornate stone building with a clock tower. Overlaid on this background is the text "Today's Quiz" in a large, black, sans-serif font. Below the title, there is a single bullet point: "• Can you name the four European Union Countries that drive on the left?". In the bottom right corner of the sign, there is a smaller inset photograph of a road sign. The sign is yellow with black text that reads "PLEASE REMEMBER TO DRIVE ON THE LEFT" and "SURAT THANI HIGHWAY DISTRICT".

**Today's Quiz**

- Can you name the four European Union Countries that drive on the left?

**Appendix W: Screen Shot from the Digital Sign in the Experimental Condition**

The screenshot shows a digital sign with a light blue background. In the top left corner, there is a black square logo for 'SCHOOL OF BANGOR PSYCHOLOGY' featuring a grid of white dots. The main text 'Today's Quiz' is centered in a large, black, sans-serif font. Below the title, a bullet point asks: 'How many of the 10 commandments can you name?'. To the right of the text is a painting of Moses holding up the stone tablets. The background of the sign is a faded image of a large, stone building with a central tower and arched windows.

**Today's Quiz**

- How many of the 10 commandments can you name?