Game Design Strategies for Collectivist Persuasion

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Abstract

A fundamental feature of serious games is persuasion, an attempt to influence behaviors, feelings, or thoughts. Much of the existing research on serious games and, more generally, on persuasive technology (PT), does not address the important links between persuasion and culture. It has tended to originate from Western, individualist cultures, and has focused on how to design for these audiences. In this paper, we describe the design of one of two versions of a serious game we developed about quitting smoking titled *Smoke?* which is targeted at collectivist players. We show how the design was informed by persuasive strategies we identified from the cross-cultural psychology literature, intended for use in games for players of collectivist cultures: HARMONY, GROUP OPINION, MONITORING, DISESTABLISHING, and TEAM PERFORMANCE. We then discuss the results of a quantitative investigation of the effects of both game versions on both individualist and collectivist players.

CR Categories: K.8.0 [PERSONAL COMPUTING]: General—Games; H.1.2 [INFORMATION SYSTEMS]: User/Machine Systems—Software psychology.

Keywords: Game design, serious games, persuasion, culture.

1 Introduction

A central feature of many serious games is persuasion, an attempt to influence behaviors, feelings, or thoughts. Serious games share important common ground with *persuasive games*, "videogames that mount procedural rhetorics effectively" [Bogost 2007], and *persuasive technology* (PT), "any interactive computing system designed to change people's attitudes or behaviors" [Fogg 2003]. Attitudes and behaviours are often heavily influenced by culture [Hofstede 1996; Triandis 1995], which we view as shared learned patterns of beliefs and behaviours that govern how an individual interacts with others and the environment. Very little research on serious games or persuasive technologies, however, focuses on the important role that culture plays in persuasion. Additionally, this research has tended to originate from Western cultures, and provides little direction for how to design for non-Western cultures.

In this paper, we present the design of one of two versions of a web-based Flash game we developed called *Smoke?* about smoking cessation, targeted at Māori[1] players. We discuss how its design was informed by a set of design strategies we identified from the cross-cultural psychology literature relating to the bipolar dimension of *individualism – collectivism*. We define individualism and collectivism as follows:

Individualist societies are those in which the ties between individuals are loose: people are expected to look after themselves and their immediate family only. Individual interests outweigh group interests, and individualists tend to be self-motivated and goal-oriented, using guilt and loss of self-respect as motivators [Hofstede 1996]. Individualists also exhibit more attitude-behaviour consistency than collectivists, perform their duties if it is advantageous in terms of benefit, and have a self-identity that is defined independently of specific collectives [Triandis 1995].

In contrast, *collectivist* societies are ones in which, from birth onwards, people are integrated into strong, cohesive *ingroups*, which are groups of people about whose welfare a person is concerned, and separation from whom leads to anxiety. These ingroups protect their members in exchange for unquestioning loyalty. Group interests outweigh individual interests, and individuals strive to maintain social harmony, adapt skills and virtues necessary for being a good group member and maintaining tradition. Shame and loss of face are typical motivators [Hofstede 1996]. Collectivists exhibit less attitude-behaviour consistency than individualists, enjoy doing "what is right" for their collective, and have self identities that are strongly linked to attributes of their group [Triandis 1995].

In reality, the issue of cultural identity is more complex than this categorisation indicates, and individuals may have multiple cultural identities. The *individualism – collectivism* dimension does, however, serve as a useful tool for conceptualising the general belief and behavioural patterns of particular groups.

In the upcoming sections of this paper, we overview existing related research, we present our game design strategies for collectivist persuasion alongside the collectivist version of our game *Smoke?* and we discuss the results of a quantitative evaluation of the effects of the collectivist and individualist versions of *Smoke?* on players.

2 Background

The notion of culture is touched on in a number of serious games. For example, *September 12th* uses a simulation mechanic to express one view of the spread of terrorism contextualised within a Middle Eastern setting [Frasca et al. 2003]. The game has limited interactive possibilities, thus it is not possible to divorce the rhetoric of the spread of terrorism from its cultural context: conceivably its makers intended to create exactly this connection in the minds of players. *America's Army* is another game with an underlying message closely tied to culture [United States Army 2002], but focuses rather on value transference to its players, as it reflects army culture and emphasises the importance of army values. Within the serious games literature, researchers have also examined representations and conceptualisations of race in games such as Everquest and World of Warcraft [Higgin 2009]. What appears to be underinvestigated at present are games designed to harness underlying motivations of their target players' cultures to facilitate persuasion.

Even in more general non-game-based PT, culture is rarely a de-

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[1] Māori are the indigenous people of New Zealand.

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sign factor. Almost all of the explicit PT research originates from countries classified as individualist, and focuses on tools destined for individualist audiences. In the domain of smoking cessation tools, we encountered just one project addressing culture, *STOMP: Stop Smoking With Mobile Phones*. STOMP was initiated in New Zealand (NZ), and focused on providing its users with cessation-related support via mobile phone SMS messages [Bramley et al. 2005]. Its researchers designed one set of messages for NZ European participants, and another for Māori participants. Along with standard quitting advice, the Māori set of messages made use of Māori language and referenced Māori traditions. Although culture played an important role in *STOMP*, language cues were the only means of cultural differentiation between the two culturally-targeted services [Bramley et al. 2005]. Its researchers did not look at how culture could have been harnessed to inform tool interaction.

In contrast, the simulation literature features more work directly pertaining to cross-cultural differences. Certain researchers have looked at how people of particular kinds of cultures are likely to respond to simulation games [Hofstede 2008], while others have developed (mainly analog) simulation games to serve as intercultural training tools [Damron and Halleck 2007]. While the goal of these games is generally to educate participant-viewers about cultures and culturally-rooted behaviours, they tend not to incorporate culture in a more general role as a rule system from which other issues, such as health, are explored.

In the HCI domain, *cultural dimensions*, aspects of culture that can be measured relative to other cultures, especially those proposed by the sociologist Geert Hofstede, have proved to be popular tools for reasoning about culture and technology [Hofstede 1996]. One of the early uses of Hofstede's dimensions was Aaron Marcus's analysis of websites, in which he demonstrated how aspects of website design from different countries supported what the dimensions proposed about their national cultures [Marcus and Gould 2000]. Other HCI investigations relying on cultural dimensions includes Vanessa Ever's research into cross-cultural understanding of interface metaphors [Evers 2001], and Thomas Vöhringer-Kuhnt's investigation into the influence of culture on people's perceptions of usability [Vöhringer-Kuhnt 2001]. Although there are a number of such research initiatives focused on cultural aspects of HCI, this literature does not focus on the relationship between culture and persuasion. It has tended to focus on productivity applications over persuasive ones. Applications under investigation have therefore not been designed to explicitly shape people's attitudes through use.

Culture is a pervasive factor in day-to-day life, and by extension plays a part in shaping the design preferences of game and PT designers, and the strategies they use and embed in their products. In making design decisions, designers constantly make culturally-based value judgements about what they personally find persuasive, what they believe their target audience finds persuasive, and which persuasion motivations to foreground within their designs. Sometimes designers make these decisions consciously, and at other times unconsciously, but undoubtedly, decisions are always made.

While it may be exceptionally difficult for designers to identify cultural preferences that they have unknowingly "embedded" into their technologies, these ideals and values will resurface when the technologies are used by audiences the designers were not considering. As the anthropologist Edward Hall explains:

The only time one is aware of the control system is when things don't follow the hidden program. This is most frequent in intercultural programs [Hall 1976].

Hall was referring here to the hidden internalised "cultural programs" people operate with, that form integral parts of our personalities [Hall 1976]. At the same time, his words seem to carry particular resonance for game players and technology users who have felt dissatisfaction caused by mismatched assumptions about their identity, their knowledge base, their behaviour, or their typical interaction patterns. This consequence should concern designers of serious games and general PT, as making users uncomfortable is unlikely to be conducive to attitude and behavioural change.

Figure 1: The concentration-sandwich minigame from *Smoke?*

In recognising and identifying cultural differences between users, and differences in perception of persuasiveness, we are in a stronger position to identify the best ways to trigger persuasion in games and tools. Referring again to Hall's "hidden program", if the cultural assumptions of a serious game or PT match those of its users, their attention is then able to focus on the informational content related directly to attitude and behaviour change. In short, this might increase their potential effectiveness.

3 Collectivism focused persuasive design strategies

To investigate the role of culture in persuasion, we developed two versions of a serious game promoting smoking cessation titled *Smoke?* One of the versions was designed for Māori players (the NZM game), as Māori are traditionally classified as collectivist [Patterson 1992]. The other version was designed for NZ European players (the NZE game), who are classified as individualist [Hofstede 1996; Triandis 1995]. Both versions feature a character, MC, who can be male or female, and who has just decided to quit smoking. The game represents the next six weeks of MC's life, and the player can choose to help or hinder MC's attempt to quit.

The design of the NZM game was informed by a set of collectivist persuasive design strategies, which we discuss next. We note that the design of the NZE game, which we addressed in another publication [Khaled et al. 2006], was *not* informed by these strategies. Table 1 summarises the differences between the two game versions.

Our collectivism focused persuasive design strategies were synthesised from a number of sources. These include the cross-cultural psychology literature on the behavioural and motivational differences between individualists and collectivists, cross-cultural consumer psychology research, interviews with NZ social marketing practitioners of both Māori and NZ European origin, and Fogg's PT strategies [Fogg 2003]. We performed a conceptual textual analysis on Fogg's strategies to determine cultural biases, using as an an-

	NZE game	*NZM game*
Minigames	Individual context	Social context
Relationship with NPCs	Lesser involvement and emotional dependence	Greater involvement and emotional dependence
Advantages of quitting	Major focus on effects for MC	Focus on self and effects on MCs family and friends
Disadvantages of smoking	Major focus on effects for MC	Focus on self and effects on MCs family and friends

Table 1: Key differences between NZE and NZM games

alytical context the literature findings on motivational differences between individualists and collectivists. The analysis indicated that Fogg's PT strategies are motivationally better suited towards individualist cultures [Khaled et al. 2005].

Many of these strategies are designed for use in the context of ingroup goals. They are premised on the assumption that ingroup members are supportive of these goals and would willingly share personal information with other members. We suggest that this is likely to be the case for collectivist users. While any number of circumstances may lead to ingroup members deciding that they do not want to pursue an ingroup goal, a fundamental characteristic of collectivists is the prioritisation of group goals over personal ones [Hofstede 1996; Markus and Kitayama 1991; Triandis 1995].

3.1 The HARMONY strategy

Antecedents Collectivists often choose to live in close proximity with their ingroup members [Patterson 1992; Triandis 1995]. Socialisation in collectivist cultures emphasises interdependence and the importance of acting to preserve harmony and facilitate co-operation [Gudykunst and Matsumoto 1996; Hofstede 1996; Markus and Kitayama 1991; Triandis 1995]. The drive to retain a harmonious atmosphere even impacts on conflict resolution as collectivists will avoid direct confrontation unless it is absolutely necessary [Gudykunst and Matsumoto 1996; Markus and Kitayama 1991; Triandis 1995]. Related to harmony is the drive to act in the best interests of the group. Both our interview data and the cross-cultural literature support the notion that collectivists give precedence to ingroup interests and responsibilities over personal ones [Gudykunst and Matsumoto 1996; Hofstede 1996; Triandis 1995].

Description The HARMONY strategy involves presenting social density cues to users. The cues serve to suggest to users that they are in a socially dense environment with members of their ingroup, in order to promote *harmonious* actions that support group goals.

Application: social minigames The NZM and NZE versions of *Smoke?* both feature minigames, one of which tests MC's ability to concentrate. While the NZE minigames are designed to draw attention to MC in an individual context, the NZM minigames are designed to highlight MC's progress (or lack of progress) in a highly visible social context. This context is peopled with others he cares about and whose opinions matter to him. The NZM concentration minigame requires the player to help MC make sandwiches for other family members, who watch and react to MC (figure 1). In this scenario, we intended players to feel motivated by their responsibility towards other members of MC's ingroup[2].

[2]This scenario was directly inspired by comments from participants in a Māori focus group about perceptions of smoking.

Consequences The HARMONY strategy reminds users of how they can act in the group's interests, and assist in maintaining group harmony. Users are then motivated to make decisions and act based on supporting the group's goals as far as possible. There are inevitably contexts in which users decide to go against the wishes of the ingroup. This strategy only applies to situations in which individuals have already committed to supporting ingroup goals.

3.2 The GROUP OPINION strategy

Antecedents Collectivists place more importance on the opinions of others in their ingroup than do individualists when making decisions [de Mooij 2005; Hofstede 1996; Markus and Kitayama 1991; Triandis 1995]. They are more likely to be concerned about acting in the best interests of the group over their own interests, and group interests might change according to the situation [de Mooij 2005; Hofstede 1996; Markus and Kitayama 1991; Triandis 1995]. As a result, the opinions of others often have a strong shaping influence on their decisions [Aaker and Maheswaran 1997; Pavlou and Chai 2002]. Research has also shown that collectivists tend to be less effective if they feel they are performing an activity in isolation, while being more effective in group situations [Hofstede 1996; Triandis 1995]. Accessing the opinions of other ingroup members is not always feasible, however, and can be time consuming.

Description The GROUP OPINION strategy involves providing users with the opinions of other ingroup members or users similar to them[3] at moments when they are required to make important decisions related to their own goals.

Application: the moods + opinions box In the NZM version of *Smoke?* the *moods + opinions* box contains iconic representations of three family members and one friend. As players progress through the game narrative and interactions, each of the character icons' facial expressions may change in accordance with their current mood. Their mood is determined by how they individually perceive MC's choices. In addition to expressing moods, each character icon can express opinions on MC's actions. The offering of an opinion is indicated by the character icon flashing. These opinions typically appear when players are required to make a decision on behalf of MC. By clicking on a character icon, players can view that character's opinion about what MC should do.

Consequences The GROUP OPINION strategy partially simulates the experience of making a decision by consulting other ingroup members. Being reminded of the existence of the group when making decisions may help an isolated group member feel more supported and speed up the decision making process. Further, if the decision is one that concerns a group interest, the decision maker is better informed about how to make a decision that best suits everyone's interests. Finally, social comparison theory shows that people of any culture tend to be naturally interested in the opinions and progress of others as they are constantly benchmarking their own behaviours against those of others [Festinger 1954].

3.3 The MONITORING strategy

Antecedents Collectivists are accustomed to the constant presence of other members of their ingroup [de Mooij 2005; Hofstede 1996; Markus and Kitayama 1991; Triandis 1995]. This puts the ingroup in the position of observing other group members' actions

[3]The similarity might be based on shared social networks, careers, schools, socio-economic backgrounds, or interests.

Figure 2: Gran's opinion of MC taking Arihia's phone number

and behaviour in what is effectively passive surveillance. In Western cultures, surveillance has negative connotations, while monitoring of one's own behaviours is perceived as acceptable. In contrast, collectivists are adjusted to surveillance by their ingroup members. Given their interdependence with the group members, their identities are informed by the ingroup identity. Further, collectivists are more effective in group situations as compared to ones in which they work alone [Hofstede 1996; Triandis 1995]. In addition, the constant presence of the ingroup acts as a reminder of expected behaviour because behaviour in collectivist cultures tends to be situationally dependent, and motivated by collective responsibility [de Mooij 2005; Markus and Kitayama 1991; Triandis et al. 1988]. Finally, collectivists are known to measure their own performance through the assessments of other ingroup members [Hofstede 1996; Markus and Kitayama 1991; Triandis et al. 1988].

Description The MONITORING strategy involves tracking behaviour that users wish to change and making this information available to other trusted group members. In appropriate situations, the group members act as mentors, using the information to support users and keep them motivated to change their behaviour.

Application: Jade's status The NZM version of *Smoke?* prominently features one character that the NZE version does not: Jade, MC's younger sister. Jade spends large amounts of time with MC and views MC as a role model. Jade has her own status screen, which details her likelihood of being adversely affected by smoking. Jade's status is directly related to MC's actions because what MC does in Jade's company is reflected in Jade's future attitudes and smoking likelihood. While this is a simplified cause-and-effect relationship, we anticipated that awareness of being monitored by Jade would trigger players into making responsible choices.

Consequences The MONITORING strategy harnesses the situationally dependent nature of collectivist behaviour [Gudykunst and Matsumoto 1996; Markus and Kitayama 1991; Triandis et al. 1988]. The context becomes one in which users are aware that they are being monitored by other ingroup members, and they act accordingly. The role of a mentor is to serve as a positive influence for the person being monitored, and to track and reflect this person's progress. In addition, although users are being monitored by others, the close level of identification between users and their mentors means that the monitoring is more akin to monitoring one's own behaviour. An ethical issue related to any surveillance concerns individuals or groups obtaining information about other individuals or groups. The issue is mitigated, however, if the individual under watch welcomes the information sharing, which is more likely to be the case for collectivists and their ingroup member mentors.

3.4 The DISESTABLISHING strategy

Antecedents The use of praise in individualist cultures is a widespread parenting practice [Triandis 1995]. It is linked to the notion of *self-esteem*, a prominent concept in individualist cultures, but less important and relevant in collectivist ones [de Mooij 2005; Markus and Kitayama 1991; Tafarodi and Walters 1999; Triandis 1995]. Praise is less common in collectivist cultures, and has been associated with leading to excessive pride in individuals [Schoeffel et al. 1994; Triandis 1995]. In terms of operant conditioning for teaching behaviour, rather than the use of positive reinforcement, a noted characteristic of collectivist cultures is the use of punishment [Schoeffel et al. 1994; Triandis 1995]. While positive reinforcement focuses on encouraging behaviours, punishment focuses on weakening behaviours.

Description The DISESTABLISHING strategy concerns training users *out* of practising specific actions or behaviours that they do not want to perform. It focuses on the weakening of undesirable behaviours by triggering self-selected *reminder* cues when the undesirable behaviour is detected.

Application: telling off MC's best friend Research on smoking cessation campaigns has shown that smokers often feel targeted by negatively-framed messages and begin adopting disengagement beliefs [Kleinjan et al. 2006]. We were wary of making players feel they were being reprimanded. To avert this reaction, the NZM game features an aunt character who is an advocate for smoke-free lifestyles and critical of other smokers in the NZM game, but who does not overtly direct her criticism at MC. For example, in one particular scene when MC's best friend begins smoking at a family picnic, the aunt reproaches the best friend for smoking in Jade's presence. We hoped that in witnessing this exchange, players would be able to think more objectively about negative consequences without MC featuring as the target of disapproval. A further justification for this indirect approach is that collectivist cultures tend to be *high context*, meaning that people are closely observant of each other and read much underlying meaning into peoples' words and actions [Gudykunst and Matsumoto 1996; Hall 1976; Markus and Kitayama 1991; Triandis et al. 1988]. Accordingly, we hoped that players might observe the experiences of the other characters, and apply their learnings to MC and potentially even themselves.

Consequences The DISESTABLISHING strategy focuses on weakening undesirable behaviours. The cross-cultural psychology literature shows that collectivists learn proper conduct by focusing on improper conduct [Markus and Kitayama 1991; Triandis 1995]. In addition, collectivist cultures tend to be *tight*, meaning that they feature many rigid rules regarding conduct [Triandis 1995]. From a Western perspective, this strategy may seem ethically ambiguous [Fogg 2003]. Rather than arguing for the need to *punish*, however, we are arguing for the need to focus on undesirable behaviours that users themselves wish to weaken. Furthermore, it is possible to do so without punishment, but by relying on reminder cues. It is important that users are given the option of establishing the form and frequency of the reminder they wish to receive, along with the ability to disable or modify the reminders at any point.

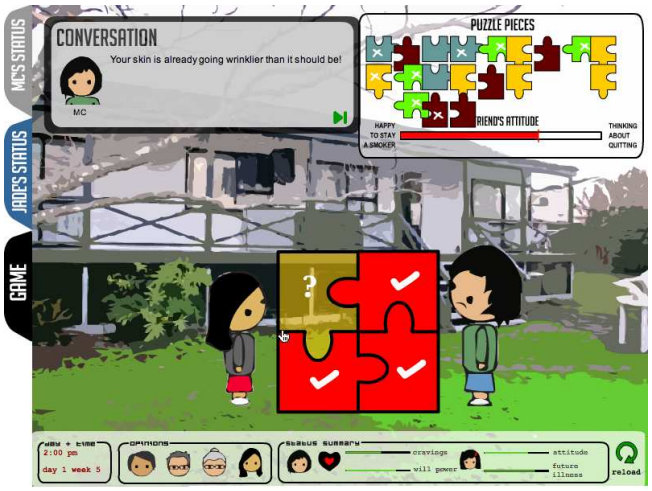

Figure 3: Convincing MC's best friend to quit

3.5 The TEAM PERFORMANCE strategy

Antecedents Collectivists' self identities are to a large extent informed by the ingroup identity [Hofstede 1996; Markus and Kitayama 1991; Triandis 1995]. A close level of interdependence with the group also means that members are motivated to act in ways that uphold the ingroup's reputation, or at the very least, minimise bringing shame on the ingroup. As surveillance is currently used in the workplace or in public areas, it tends to track the behaviour of individuals, or perhaps a group of individuals, but generally results in either the promise of rewards or punishment for the individual [Fogg 2003]. Collectivists, however, not only tend to be more effective in group situations, but are more concerned with contributing towards ingroup goals than individual goals [Hofstede 1996; Markus and Kitayama 1991; Triandis 1995].

Description The TEAM PERFORMANCE strategy concerns tracking the behaviour of individuals constituting a group. It rewards or reprimands all members of the group on the basis of the actions of each individual that are related to a group goal.

Application: the convince challenge In the NZM version of *Smoke?* if players are largely successful in keeping MC smoke-free, they are presented with an additional challenge: to convince MC's best friend to consider quitting smoking by choosing the "correct" combination of four cessation arguments. Figure 3 shows a screenshot from this challenge. In a real world scenario, we are aware that the success or failure of MC convincing the best friend to quit would in fact have the greatest impact on the best friend, but, in a collectivist culture, other ingroup members would also share in the best friend's successes and failures, as they would impact on the group overall. In the spirit of group solidarity, if players succeed in presenting a successful combination of cessation arguments to the best friend, the best friend will consider quitting. As a result, MC will benefit from a boost in mental well-being, reflecting a connection between her well-being and the best friend's well-being.

Consequences The TEAM PERFORMANCE strategy shifts the locus of the persuasion goal to a group level. It reminds individuals who identify with an ingroup that their combined actions have consequences for the goal outcomes of the whole group. By seeing how their actions can lead to benefits or disadvantages for the ingroup, users might be more motivated to continue these actions. As such, it is important that the technology clearly identifies to its users which of their individual behaviours affect the group outcome. This strategy also requires clear definitions of groups and group members so that individuals know whose actions affect them and vice versa.

4 Evaluation

In order to validate the strategies that informed the design of the NZM version of *Smoke?* we decided to investigate the relative effectiveness of the two versions of *Smoke?* on different audiences. In terms of explicit outcomes, our objective was to determine whether individualist players would find the NZE version of *Smoke?* more persuasive than the NZM version and whether collectivist players would find the NZM version more persuasive than the NZE version. Given the timeframe of the study, we decided to focus only on players' short term attitude changes resulting from the game. As such, we conducted a quantitative evaluation of the effects of the two versions of *Smoke?* on individualist and collectivist audiences.

4.1 Experiment design

In the cross-cultural psychology literature, pre- and post-surveys predominate as a method of measurement of attitude change following phenomena exposure. We adopted this approach ourselves by presenting players recruited from our university with a survey before and after playing through a randomly allocated version of *Smoke?* Focusing on cultural orientation and game version, our experiment relied on a between-participants 2x2 factorial design: individualism versus collectivism and NZE version versus NZM version. We ran the experiment on 141 participants between the ages of 17 and 25. 71 participants played the NZE game and the remainder were assigned the NZM game. 71 participants self-identified their ethnicity as NZ European, and 46 self-identified with the Māori or Pacific peoples ethnic group. As discussed earlier, NZ Europeans are likely to be individualistic in their outlook, while Māori are more likely to be collectivistic (although acculturation complicates the issue of Māori culture categorisation). The Pacific peoples category is a heterogeneous group, including Samoans, Tongans, and Niueans [Statistics New Zealand 2002]. Pacific cultures are also classified as collectivistic [Schoeffel et al. 1994; Webster 2001]. The remainder of the participants identified with a range of ethnicities, including Chinese and Indian. China and India are generally regarded as collectivist cultures [Hofstede 1996; Triandis 1995]. In terms of smoking behaviour, 43 of the participants described themselves as current smokers, 32 described themselves as ex-smokers, and the remainder described themselves as non-smokers.

4.2 Measuring cultural orientation

Our pre-survey contained a question on self-identified ethnicity. We grouped the ethnicity responses to fit within the categories of "NZ European", "Māori or Pacific", "other Europeans", and "all others". As the term *ethnicity* can be ambiguous, one section of the pre-survey contained items from Schwartz's values survey [Schwartz 1992], from which we created two variables corresponding to the subjects' degree of *individualism* and *collectivism*. Those who were categorised as "NZ Europeans" and "other Europeans" had higher total means for *individualism* and lower total means for *collectivism* than those categorised as "Māori or Pacific", and "all others", who had higher total means for *collectivism* and lower total means for *individualism*. For the rest of our analyses, then, we used the *individualism* and *collectivism* variables to identify subjects' cultural orientations. Subjects with high *individualism* or low *collectivism* scores were considered individualist, while those with low *individualism* or high *collectivism* were considered collectivist.

4.3 Measuring attitudes towards smoking

Both the pre- and post-surveys contained items about subjects' beliefs regarding smoking, which were drawn from surveys used in previous studies on smoking cessation [Burke et al. 1992; Dijkstra et al. 1999]. The items were grouped to determine means measuring participants' *positive beliefs* about smoking, their *negative beliefs* about smoking, their *intention to quit* if they were smokers, their *resistance to smoking* if they were non-smokers (i.e. how strongly they felt that smoking was undesirable), and finally, their *temptation to smoke*. We were then able to compare how the values of the means changed across pre- and post-survey responses. In addition, the pre-survey contained items concerning the role smoking played in the participants' lives.

4.4 Regression model of attitudes towards smoking by cultural orientation and game version

To explore the relationship between game version, cultural orientation, and pre- and post-survey responses, we used a multiple regression model estimated by the ordinary least squares method. Our model featured the following variables as regressors: *status*: the mean variable relating to subjects' smoking behaviour; *proximity*: the mean variable relating to the importance of smoking in subjects' lives; *version*: a categorical variable describing the game version that subjects played; one of either *individualism* or *collectivism*: mean variables representing subjects' degree of individualism or collectivism; and *interaction*: a crossproduct interaction term representing the joint effect of *version* and one of either *individualism* or *collectivism*. We then regressed each of the five post-survey means of *positive beliefs*, *negative beliefs*, *resistance to smoking*, *intention to quit*, and *temptation to smoke* on our model, including the corresponding pre-survey mean as an additional regressor.

4.5 Significant interactions

Intention to quit smoking We investigated the following hypotheses by regressing post-survey means for smokers' *intention to quit* against regressors of *status*, *proximity*, smokers' pre-survey *intention to quit*, *version*, *individualism*, and *interaction*:

H1a: Individualist players will have a greater positive change in intention to quit smoking after playing the NZE version of Smoke? than after playing the NZM version.

H1b: Collectivist players will have a greater positive change in intention to quit smoking after playing the NZM version of Smoke? than after playing the NZE version.

For each *t ratio* calculated in our model, we determined a relevant *p-value*, the probability of obtaining results at least as extreme as the ones observed, supposing in fact that cultural orientation and game version together, represented as the *interaction* regressor, had no effect on *intention to quit*. We summarise the details of the *intention to quit* regression model in table 2.

In the *intention to quit* model, the effect of *interaction*, the regressor term representing the joint effect of *version* and *individualism*, is significant at the $p < 0.05$ level using a one-sided test.

Individualist smokers who played the NZE version of *Smoke?* demonstrated a greater positive change between pre- and post-survey *intention to quit* than those who played the NZM version. This result supports H1a.

Collectivist smokers who played the NZM version of *Smoke?* demonstrated a greater positive change between pre- and post-survey *intention to quit* than those who played the NZE version. This result supports H1b.

Regressor	$\hat{\beta}$		*Std. Error*	*t ratio*
Constant	1.988	*	.795	2.501
status	-.046		.038	-1.213
proximity	.229	*	.060	3.794
pre- intention to quit	.888	*	.056	15.946
version	-2.039	*	1.051	-1.939
individualism	-.418	*	.145	-2.893
interaction	.479	*	.199	2.140
$n = 43, R^2 = .902$				

* Significant at the $p < 0.05$ level.

Table 2: Dependent variable: post-survey *intention to quit*

Both these findings support the notion that persuasion effectiveness is increased by cultural relevance. Interestingly, both game versions were more successful in shifting attitudes of collectivist players than of individualist players. This may indicate that the individualist smoker subjects were less receptive overall to persuasion about quitting smoking than the collectivist smoker subjects.

Resistance to smoking We investigated the following hypotheses by regressing post-survey means for subjects' *resistance to smoking* against regressors of *status*, *proximity*, pre-survey *resistance to smoking*, *version*, *individualism*, and *interaction*:

H2a: Individualist subjects will have a greater positive change in resistance to smoking after playing the NZE version of Smoke? than after playing the NZM version.

H2b: Collectivist subjects will have a greater positive change in resistance to smoking after playing the NZM version of Smoke? than after playing the NZE version.

We summarise the details of the *resistance to smoking* regression model in table 3, calculating *p-values* from the *t ratios*, as we did for the *intention to quit* model.

Regressor	$\hat{\beta}$		*Std. Error*	*t ratio*
Constant	1.241	*	.553	2.242
status	.012		.024	.494
proximity	-.049	*	.035	-1.414
pre- resistance to smoking	.786	*	.069	11.368
version	-1.199	*	.660	-1.817
individualism	-.058		.092	-.632
interaction	.220	*	.125	1.758
$n = 107, R^2 = .626$				

* Significant at the $p < 0.05$ level.

Table 3: Dependent variable: post-survey *resistance to smoking*

In the *resistance to smoking* model, the effect of *interaction*, the regressor term representing the joint effect of *version* and *individualism*, is significant at the $p < 0.05$ level using a one-sided test.

Individualist subjects who played the NZE version of *Smoke?* demonstrated a lesser positive change between pre- and post-survey *resistance to smoking* than those who played the NZM version. This result does not support H2a.

Collectivist subjects who played the NZM version of *Smoke?* demonstrated a greater positive change between pre- and post-survey *resistance to smoking* than those who played the NZE version. This result supports H2b.

At the same time, we note that individualist players of the NZE version of *Smoke?* demonstrated significantly more attitude shift than collectivist players of the NZE version. This appears to indicate that while the NZM version seems to be more effective in increasing all players' resistance to smoking, the NZE version is comparatively more effective on individualist rather than collectivist players. We hypothesise that, despite our intention to design *equally* persuasive game versions, irrespective of cultural factors, aspects of the NZM version may simply have been more persuasive than the NZE version. Effective persuasive game design is a rather new area of research and needs to mature before general design principles regarding persuasion are established.

Interestingly, while *resistance* through collective support, as in the NZM version of *Smoke?* may seem more like a collectivistic concept, it is in fact a central feature of organisations like *Weight Watchers* and *Alcoholics Anonymous*. Both have been very successful in Western (individualist) cultures. This may indicate that for increasing attitudes related to different types of resistance, individualists may benefit from collective support as much as collectivists, if not more. We hypothesise that because it is less part of their everyday interaction, it has additional persuasion for them.

Temptation to smoke We investigated the following hypotheses by regressing post-survey means for *temptation to smoke* against regressors of *status*, *proximity*, pre-survey *temptation to smoke*, *version*, *collectivism*, and *interaction*:

H3a: Individualist subjects will have a greater negative change in temptation to smoke after playing the NZE version of Smoke? than after playing the NZM version.

H3b: Collectivist subjects will have a greater negative change in temptation to smoke after playing the NZM version of Smoke? than after playing the NZE version.

We summarise the details of the *temptation to smoke* regression model in table 4.

Regressor	$\hat{\beta}$		*Std. Error*	*t ratio*
Constant	-.350	*	.225	-1.554
status	-.003		.028	-.123
proximity	.070		.171	.412
pre- temptation to smoke	.756	*	.072	10.514
version	.673	*	.269	2.506
collectivism	.158	*	.045	3.521
interaction	-.171	*	.062	-2.739
$n = 66, R^2 = .705$				

* Significant at the $p < 0.05$ level.

Table 4: Dependent variable: post-survey *temptation to smoke*

In the *temptation to smoke* model, the effect of *interaction*, the regressor term representing the joint effect of *version* and *collectivism*, is significant at the $p < 0.05$ level using a one-sided test.

Individualist subjects who played the NZE version of *Smoke?* demonstrated a lesser negative change between pre- and post-survey *temptation to smoke* than those who played the NZM version. This result does not support H3a.

Collectivist subjects who played the NZM version of *Smoke?* demonstrated a lesser negative change between pre- and post-survey *temptation to smoke* than those who played the NZE version. This result does not support H3b.

So, interestingly, neither of our hypotheses regarding *temptation to smoke* were supported by the regression model findings. This outcome deserves some consideration. The smoking cessation literature has reported in depth on how cue exposure increases urges to smoke [Niaura et al. 1999]. We suggest that when subjects played a game version that reflected their cultural orientation, that is, the culturally-congruent condition, they were better able to engage with the game content by the context of their personal lives. Encountering smoking cues may thus have elicited smoking-related thoughts and general curiosity about smoking in players, leading to a smaller drop in temptation to smoke. In the culturally-incongruent condition, we hypothesise that players were less able to contextualise the game to their personal lives and were, therefore, less likely to be tempted by smoking cues. In turn, this response corresponded to a greater drop in temptation to smoke. Potentially, then, culturally-relevant cue exposure is a factor designers should account for when designing tools to help people deal with cue-stimulated cravings: it may increase the potency of cue exposure effects.

As an additional interpretation, in our previous research we noted that NZ Europeans may view smoking as an activity with a more individual locus, while Māori may view it as having a more collective locus [Khaled et al. 2006]. In the culturally-incongruent conditions, smoking was portrayed in a more collectively-oriented manner for individualist players and a more individually-oriented manner for collectivist players. Given the direct mismatch between real life and game portrayals, smoking may have seemed more foreign and incongruent as an activity, and therefore less appealing. In turn, this may have led to greater increases in temptation reductions.

4.6 Discussion

The subject matter of *Smoke?* certainly impacted on how we applied the design strategies and also how they would have been perceived. For example, smoking is considered harmful to others in both individualist and collectivist cultures alike. For research reasons, however, in the NZE game we focused less on social concerns, even though we are aware that in ethical terms, individualists are equally conscientious of their effects on others. In addition, we were only able to indirectly evaluate our strategies, through players' perceptions of the NZE and NZM games as cohesive artifacts. Without doubt, different implementations would have yielded different results, and we hope to explore further potential implementations of the strategies in future work.

5 Conclusions

Serious games are intended to influence attitudes and behaviours, yet many of these attitudes and behaviours are influenced, in turn, by culture [Hall 1976; Hofstede 1996; Triandis 1995]. Harnessing the culturally relevant motivations underlying people's actions, both in an individual and social context, has been shown in other domains to lead to greater persuasion. By accounting for culture in design, we are more likely to produce serious games and other PTs with increased sensitivity, realism, and effectiveness.

In this paper, we outlined the design of one version of a culturally-relevant serious game we developed called *Smoke?* for collectivist, Māori players. Its design was informed by a set of five persuasive design strategies for collectivist persuasion that we identified from the cross-cultural psychology literature on individualism and collectivism. These strategies are: HARMONY: presenting social density cues to users; GROUP OPINION: providing users with opinions of other ingroup members; MONITORING: sharing a user's tracking information with a support group; DISESTABLISHING: training users out of practising behaviours they do not wish to perform; and TEAM PERFORMANCE: rewarding or reprimanding a group of users for the actions of an individual user.

We also developed a version of *Smoke?* for individualist, NZ European players. We conducted a comparative, quantitative evaluation of the two games' effects on both individualist and collectivist players. We were able to find some support for the idea that the culturally-matched conditions yielded greater persuasion. Due to the complexity of the multiple factors involved in the experiment, including potential cue exposure effects and social perceptions of smoking, it was not possible to reach a clear outcome. Our future research plans include designing additional games for collectivist players based on these strategies, but focusing on a lesser number of factors in order to explore their effects on persuasion and play.

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