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Go with the flow: How children's persuasion knowledge is associated with their state of flow and emotions during advergame play

Short title: Children and advergames: persuasion knowledge, flow and emotions

Ini Vanwesenbeeck, Ph. D. fellowship of the Research Foundation - Flanders (FWO), Department of Communication Studies, Research Group Media and ICT in Organisations and Society (MIOS), University of Antwerp, Belgium, Tel: +32 3 265 56 68; Email: Ini.Vanwesenbeeck@uantwerpen.be

Ini Vanwesenbeeck is a PhD student at the Communication Studies department at the University of Antwerp. Her main field of interest concerns the link between children and ICT, with a strong emphasis on (internet) advertisement. In the past, she participated in several projects regarding eSafety and youth. Currently, Ini Vanwesenbeeck is working on the research project entitled "Cognitive development in a digital world: children and persuasive communication on the Internet", a research funded by the FWO, Research Foundation Flanders.

Koen Ponnet, Department of Communication Studies, Research Group Media and ICT in Organisations and Society (MIOS), University of Antwerp, Belgium; Faculty of Law, Research Group Social Competition and Law, University of Antwerp, Belgium; Higher Institute for Family Sciences, Odisee, Brussels, Belgium, Tel: +32 3 265 55 30; Email: Koen.Ponnet@uantwerpen.be

Koen Ponnet, PhD, works at the department of Communication Studies and the department of Sociology of the University of Antwerp. He is also associated with the Faculty of Law of the University of Antwerp and the Higher Institute for Family Science (HUBrussel). His research focuses on the determinants of parenting (e.g. financial stress, depression, marital conflict, etc.), and on the direct and mediating impact of mother's and father's parenting on offspring outcome. Koen Ponnet holds a master's degree in Psychology, a Master in Industrial Entrepreneurship and a PhD in Psychology. He teaches General and Social Psychology at the University of Antwerp and supervises students at the Higher Institute for Family Sciences (HUBrussel).

Michel Walrave, Department of Communication Studies, Research Group Media and ICT in Organisations and Society (MIOS), University of Antwerp, Belgium, Tel: +32 3 265 56 81; Email: Michel.Walrave@uantwerpen.be

Michel Walrave, PhD is an associate professor at the department of Communication Studies of the University of Antwerp. He is responsible for the research group MIOS that conducts research on, amongst others, young people's ICT uses. His research focuses on societal implications of ICT, and ICT-use related risks in particular. He has conducted several research projects on e-marketing, social networking sites and privacy and on cyberbullying. He teaches courses on marketing communications, institutional communication and e-marketing. Michel Walrave holds a master's degree in Communication Studies, a Master in Information Science and a PhD in Social Sciences.

Corresponding address: Ini Vanwesenbeeck, University of Antwerp, Meerminne – M171, Sint-Jacobstraat 2, B-2000 Antwerp, Belgium. Email: ini.vanwesenbeeck@uantwerpen.be

Go with the flow: How children's persuasion knowledge is associated with their state of flow and emotions during advergame play

Keywords: advertising, children, persuasion knowledge, advergames

Abstract

This study investigates children's persuasion knowledge toward an advergame. Based on the theory of limited capacity and the PAD dimensions of emotions (i.e. pleasure, arousal and dominance), we propose a model in which persuasion knowledge is associated with game flow, and in which game flow is subsequently related to self-reported player emotions. To test this model, 200 respondents between 7-12 years old were asked to play an advergame and to complete a survey addressing self-reported emotions, persuasion knowledge and game flow. Structural equation modelling partially confirms our model. Both managerial and ethical implications are discussed in the paper.

Keywords: advertising, children, persuasion knowledge, advergames

Go with the flow: How children's persuasion knowledge is associated with their state of flow and emotions during advergame play

Marketers increasingly approach children and adolescents through online branded games, also known as advergames. An and Stern (2011, p. 43) describe advergames as 'interactive online games embedded with brand messages'. These games do not include many rules, and they are therefore easy to play (Cauberghe and De Pelsmacker, 2010; Moore, 2006). In most cases, the advergame provides extensive exposure to the brand (Hernandez and Minor, 2011), with the product or brand logo often serving as an essential component of the game (Buijzen, van Reijmersdal and Owen, 2010; Culp, Bell and Cassady, 2010; Dahl, Eagle and Báez, 2009). Moreover, because the commercial message is not presented separately, but integrated into the entertaining context, advergames pose new challenges to the cognitive ability of young people to process advertising, and especially to their persuasion knowledge (An and Stern, 2011; Panic, Cauberghe and De Pelsmacker, 2013; Waiguny, Nelson and Terlutter, 2012; van Reijmersdal, Rozendaal and Buijzen, 2012). The term 'persuasion knowledge' refers to an individual's insight into persuasion attempts and tactics used for this purpose, as in advertising (Friestad and Wright, 1994). In research on children and advertising (particularly in the context of television), children's persuasion knowledge is often linked to advertising literacy. In short, children require two skills in order to understand television advertising: the ability to recognise advertising and the ability to understand its intent. In this paper, we focus on children's ability to understand the intent of advertising. This intent of advertising consists of two aspects. First, advertising has a selling intent. In other words, it is intended to have a direct influence on the behaviour of consumers by encouraging them to buy particular products (Moses and Baldwin, 2005; Rozendaal, Buijzen and Valkenburg, 2010). Second, advertising has a persuasive intent. This refers to the intention of marketeers to change the mental states of others, often in an attempt to generate beliefs about particular products (Moses and Baldwin, 2005).

When it comes to children, persuasion knowledge is often linked to developmental theories. In general, scholars agree that, as they grow older, children become more skilled in recognising advertising and in understanding its intent (John, 1999; Rozendaal et al., 2010). According to John's (1999) theory of *consumer socialisation*, three phases can be discerned in children's development of advertising processing. Children in the *perceptual phase* (3-7 years) recognise advertising only in terms of perceptual characteristics and often have a positive attitude towards advertising. These children are seen as the most vulnerable to persuasive attempts, regardless of the medium (Moore and Rideout, 2007). During the *analytical phase* (7-11 years), children learn how to recognise the intent of advertising and develop a relatively negative attitude towards it (John, 1999; Moore, 2004). At around 11 years of age, in the *reflective phase*, children are able to identify specific tactics and appeals in advertising (John, 1999). Nevertheless, research has established that children aged around 12 do not yet have an adult-level understanding of advertisers' intentions (Rozendaal, et al., 2010).

Although persuasion knowledge is often said to be related to a child's cognitive development (Waiguny et al., 2012), other factors can influence children's persuasion knowledge with

regard to advergaming. Research has shown that children have more difficulty identifying the persuasive intent of advergames as compared to television advertising (Panic, et al., 2013), as the advertising message is often subtly integrated in the gaming context. Because of the challenge they pose to children's persuasion knowledge, the present study focuses exclusively on advergames. More particularly, we have chosen to investigate children aged between 10 and 12 years old because children in this age group make frequent use of the internet (Livingstone and Haddon, 2009) and advergames are often used to target this age group (Cauberghe, De Pelsmacker, Hudders, Panic and Destoop, 2012). Furthermore, from a developmental perspective, a shift occurs in this age group from the analytical phase to the reflective phase and it is often assumed that children aged over 11 years are capable of identifying persuasive intentions (John, 1999).

Despite the growing number of studies devoted to advergaming, persuasion knowledge and children, only a few studies have concentrated on game-related variables (Waiguny, et al., 2012; van Reijmersdal, et al., 2012) and emotions towards advergames (Bailey, Wise and Bolls, 2009). We build upon this research and address these topics related to children and advergaming. Little is known about how the persuasion knowledge of children is influenced by the state of flow when playing an advergame (Terlutter and Capella, 2013). This state of flow has been proven to influence the attitudes and behavioural intentions of both adults (Gurău, 2008) and children (Waiguny, et al., 2012). Therefore, it is likely that a child's understanding of the game's persuasive intent is influenced by the game flow experience. In addition, to the best of our knowledge, no study has investigated the emotions of pleasure and dominance with regard to advergaming and children, even though scholars agree that advergames persuade largely on an emotional level (Nairn and Hang, 2012). To address these gaps in knowledge, we examine children's level of game flow and their emotions towards an advergame. More specifically, we propose a model in which the impact of flow on persuasion knowledge is assessed and, subsequently, how flow is related to player emotions. The proposed model is presented in Figure 1. This model is based on insights gleaned from four major theories in advergaming research: PAD dimensions, the PCMC model, persuasion knowledge and flow.

Insert Figure 1 about here

Conceptual framework and research hypotheses

Although advergames aim to create an emotional connection between the game and the brand (Culp, et al., 2010; Dahl, et al., 2009), only a few studies have investigated the ways in which emotions affect consumers' reactions towards brands or products after playing advergames (Bailey, et al., 2009; Hernandez and Minor, 2011). In this study, we question the extent to which emotions towards the game (pleasure, arousal and dominance) influence the child's self-reported game flow, which is an important part of the gaming experience. Emotions are expressions of affective reactions and according to Zajonc (1980), affective reactions to stimuli are formed prior to other judgements. Emotions are also frequently investigated in research on consumers (Bailey, et al., 2009; Poels and Dewitte, 2006). This paper therefore focuses on three emotional dimensions, also known as the PAD dimensions: pleasure, arousal

and dominance (Poels, Hoogen, Ijsselsteijn and de Kort, 2012; Russell and Mehrabian, 1977). Following the PAD approach, the state of an individual's emotion can be defined using a combination of these three dimensions. The dimension of pleasure can be described as the degree to which a person feels good, joyful, happy or satisfied in a situation (Mazaheri, Richard and Laroche, 2012), while the dimension of arousal refers to the level of physical and mental activation associated with the experience (Poels, et al., 2012). The dimension of dominance or control involves the extent to which an individual feels in control during an experience (Poels, et al., 2012). These PAD dimensions have proved necessary for the adequate description of emotions (Russell and Mehrabian, 1977). They proved especially useful when using verbal self-report measurement (Poels and Dewitte, 2006). Previous studies have demonstrated that children's feelings of arousal can be positively affected by the degree of customization with regard to the avatars appearing in an advergame (Bailey, et al., 2009). To date, the emotions of pleasure and dominance have not yet been addressed in research investigating children's responses to advergaming. In this study, we wish to investigate how a child's emotional responses to an advergame are related with children's game flow.

According to Csikszentmihalyi (1977) flow is the holistic sensation that people have when they are totally involved in a certain activity. In other words, flow is a state in which a person is completely engaged and immersed in an activity (Hoffman and Novak, 2009). This state is reached when there is a balance between the person's capabilities and the degree of challenge an activity poses (Ijsselsteijn, de Kort, Poels, Jurgelionis and Bellotti, 2007). Therefore, the state of flow is also described as the process of optimal experience (Hoffman and Novak, 1996). The flow state is characterised by intense concentration, time distortion and a feeling of being in control (Agarwal and Karahannal, 2000; Chen, 2007; Weber, Tamborini, Westcott-Baker and Kantor, 2009), which means that a person experiences an altered sense of time when in a state of flow. Playing computer games has been identified as an activity that induces flow (Hoffman and Novak, 2009) and previous studies have investigated how game flow is related to attitudinal responses to advergaming (Hernandez, 2011; Waiguny et al., 2012). For example, game flow has been found to enhance a player's attitude towards advergames (Hernandez, 2011), in addition to having a positive impact on brand attitudes and related behaviour (Gurău, 2008).

The three PAD dimensions are theoretically related to the concept of flow. As mentioned above, an individual's perception of control or dominance is usually identified as one of the most important aspects of flow (Csikszentmihalyi, 1977; Hernandez, 2011). There has been some discussion of how the concepts of control and flow are related (Finneran and Zhang, 2005). Some flow models consider control to be an antecedent (Chen, 2000; Ghani, 1995), while other studies treat it as a consequence. Hofmann and Novak (1996), for example, identified perceived control as a consequence of the flow state. Nevertheless, in a revised model of this theory (Novak et al., 2000), control was once again treated as an antecedent. In addition, Pavlas (2010) has emphasised that a sense of control contributes to the creation of flow. For the purposes of this study, we draw on Pavlas to argue that control is an antecedent of flow. Using the definition of flow formulated by Csikszentmihalyi (1990), Pavlas argued that the following elements are necessary to create flow: 1) having a task to accomplish, 2)

intense concentration, 3) deep, effortless involvement, 4) a sense of control over the situation, 5) immediate feedback, and 6) a clear goal. Loss of concern for the self and time distortion are two consequences of flow. Following this reasoning, it is likely that a stronger feeling of control leads to a higher level of flow (Finneran and Zhang, 2003, Pavlas, 2010). Previous studies have confirmed that a perception of control, or in other words a feeling of dominance, is significantly related to the state of flow (Hoffman and Novak, 1996). With regard to advergame play and children, we hypothesize:

H1: Children's reported dominance feelings during advergame play have a positive effect on their self-reported game flow.

In addition to control, arousal is also seen as an important characteristic of the flow state (Novak et al., 2000). Several studies on advergaming focus on arousal and advergaming (Bailey, et al., 2009; Hernandez, 2011). Skin-conduction measures have been used to demonstrate that children between 10 and 12 years old who received more options for customization within an advergame (e.g. the ability to change the avatar) experience more arousal compared to those who were provided with limited customization options (Bailey, et al., 2009). With regard to adults, research has established that arousal does not influence flow when playing advergames (Hernandez, 2011). This result is not consistent with the theory on flow and arousal. However, the study in question was unable to confirm the internal consistency of the arousal scale and suggested that the research would need to be replicated using another scale (Hernandez, 2011). Therefore, we investigate whether arousal is indeed a precursor of the flow state, as stated by Novak, Hoffman and Yung (1998). To the best of our knowledge, this has not been investigated with regard to children. Based on the theory, we therefore state that:

H2: Children's reported arousal feelings during advergame play are positively associated with their self-reported game flow.

Finally, playing an advergame can be seen as a pleasurable experience (Cauberghe and De Pelsmacker, 2010). In contrast to the emotions of arousal and dominance, pleasure is less often mentioned as an antecedent of flow. Nevertheless, pleasure is clearly linked to the construct of flow (Csikszentmihalyi, 1977), as flow is often described as an optimal or most enjoyable experience (Gilroy, Cavazza and Benayoun 2009). Although the concepts of enjoyment and pleasure seem similar, there is a difference. Enjoyment is often used as a synonym of flow, and refers to the optimal state described by Csikszentmihalyi (1977). An activity where flow or enjoyment is reached requires a certain amount of challenge and concentration, which does not necessarily mean that the activity is pleasant. On the other hand, pleasure refers to a state in which achieving comfort and relaxation is important (Csikszentmihalyi, 2003). Seeking pleasure requires neither a skill set nor intense concentration. Therefore, experiencing flow is not the same as experiencing pleasure (Gilroy et al., 2009). The precise role of pleasure in relation to flow theory is unclear and it is difficult to establish whether pleasure is a consequence or a determinant of flow (Gilroy et al., 2009). Following the above-mentioned distinction between enjoyment/flow and pleasure, flow may well occur in an affective state of displeasure, but it is assumed that this situation is difficult

to sustain (Gilroy et al., 2009). Despite the difference between pleasure and enjoyment, the two concepts clearly overlap (Csikzentmihalyi, 1991) as flow is often characterised by the pleasantness of the experience (Weber et al., 2009). For example, the Presence-Involvement-Flow Framework, which describes game users' experiences (for a detailed overview of this framework, see Takatolo, Häkkinen, Kaistinen and Nyman, 2010), views pleasure as a subcomponent of flow. Furthermore, flow is characterised by time distortion, meaning that a person experiencing flow loses track of time (Esteban-Millat, Martínez-Lopez, Luna, Rodrígez-Ardura, 2014). Literature on time distortion suggests that people feel time goes more quickly when they are engaged in a pleasant activity (Esteban-Millat et al., 2014). Following this reasoning, a pleasant experience is positively related to the state of flow, since flow entails a distortion of time. Finally, one study among adults investigated entertainment in relation to websites and found that pleasure was indeed positively associated with participants' perceptions of website entertainment (Mazaheri et al., 2012). This study was based on Zajonc's (1980) assumption that affective reactions, such as pleasure, occur prior to other judgements.

Based on the above, we formulate the following hypothesis:

H3: Children's reported pleasure feelings during advergame play are positively related to their self-reported game flow.

Further, next to the relationship between the players' emotion and the flow state, the relationship between flow and persuasion knowledge deserves further attention (Terlutter and Capella, 2013). The amount of persuasion knowledge that a child has after playing an advergame might depend not only on his or her level of cognitive development (see John, 1999 for an extensive overview), but also on game flow (Terlutter and Capella, 2013). The relationship between game flow and persuasion knowledge can be explained theoretically using the PCMC model (young people's processing of commercial media content) as introduced by Buijzen et al. (2010). The PCMC model addresses how young people process persuasive messages and is based on the theory of limited capacity (Buijzen et al., 2010). According to this limited capacity theory, a person's ability to process information is limited (Lang, 2000) and depends on the balance between resources allocated and resources required (Buijzen, van Reijmersdal and Owen, 2010). While processing a message, the recipient can allocate resources (RA) to the message, but only uses the amount of resources that is required (RR) to understand the message. If the message requires more resources compared to the RA, the recipient will not fully process the message. On the other hand, if the recipient has more RA compared to RR, resources remain available for other tasks (Buijzen, et al., 2010), such as processing other messages.

The PCMC model applies the limited capacity approach to young people's processing of persuasive messages (Buijzen, et al., 2010; Buijzen , Rozendaal, Tanis, Lang, Vermeulen and Van Reijmersdal, 2014). In this model, a differentiation is made between a primary and a secondary task. The processing of a persuasive message consists of context (e.g. watching a television program) which is the primary task, and the actual persuasive message as a secondary task (e.g. brand placement) (Lang, 2000; Buijzen, et al., 2010). According to the

PCMC model, the amount of resources that are left to process the persuasive message depends on how much resources are allocated and required to process the primary task (RA/RR). Applying these theoretical insights to the context of children and advergaming, playing an advergame is also likely to require the use of mental resources. The primary task is playing the game itself, while the persuasive message in the game can be seen as secondary. Thus, a game player needs resources in order to process the game play (i.e. primary task). Similar to the limited capacity theory, this means that there is a weighting between the resources allocated to the context (RAC) and resources required by the context (RRC) while playing the game (Buijzen, et al., 2010). Depending on the result of this ratio (RAC/RRC), a certain amount of resources remain for processing the secondary message, the advertisement (Buijzen, et al., 2010). The weighting results in four situations. First, when both RAC and RRC are low, there is a low elaboration of the game play, leaving few resources available for elaborating the persuasive message (Buijzen, et al., 2010). Second, a low RAC and a high RRC leads to a cognitive overload during game play, since there are more resources necessary to process the game than there are available (Buijzen, et al., 2010). Again, this situation results in no or low elaboration of the persuasive message. Third, high RAC and low RRC leads to a moderate elaboration of the game play, since there are not a lot of resources required to play the game (Buijzen, et al., 2010). This implies that there are resources left for the secondary message, processing the brand placement within the game. Finally, when both RAC and RRC are high, there will be a high elaboration of the context. As a result, little resources remain available to process the advertisement within the game (Buijzen, et al., 2010).

Flow theory can be linked to the theory of limited capacity and to the PCMC model. In short, the intense concentration required to achieve a state of flow means that there is no attention left to think about other elements (Weber et al., 2009). In other words, during a flow episode, a person's available attentional resources are used up by the task at hand (Weber et al., 2009), which leads to no resources being left for other tasks. This theoretical insight can be applied to advergaming. Playing an advergame can result in a state of flow for the player. In this state, the player allocates his/her available cognitive resources to the task at hand (in this case playing the advergame). As a consequence, while in this state of game flow, players do not reflect upon their actions consciously (Csikszentmihalyi, 1977). This also means that, for the duration of the flow episode, a person's skills match the mental demands of the flow activities (Csikszentmihalyi, 1977). Following the above-stated PCMC model, one could argue that in a state of flow the ratio between RAC and RRC equals zero. This means that no resources are left available for the persuasive message, which might result in a lower understanding of its persuasive intent. With regard to flow and persuasion knowledge, one study amongst children found no support for the association between flow state and the identification of commercial content (Waiguny, et al., 2012). Although this study used observational data with regard to flow and it operationalized the state of flow as the level of challenge (i.e. under-challenged, balanced or over-challenged), the study did reveal that brand attitudes were lower for children who were underchallenged and recognized the commercial content (Waiguny, et al., 2012). An explanation for this finding is that children who experience enjoyment and flow

are not motivated to consider unpleasant elements, such as an advertiser's intent, which lead to a higher influence of the advergame on brand attitude (Waiguny, et al., 2012).

Based on the theoretical insights mentioned above, we hypothesize:

H4: Children's self-reported game flow has a negative effect on their persuasion knowledge with regard to advergaming.

Based on the abovementioned hypotheses, we developed the conceptual framework shown in Figure 1. First, game flow is affected by the three PAD dimensions (pleasure, arousal and dominance). Second, game flow is negatively associated with children's persuasion knowledge of the advergame.

METHOD

Procedure and participants

The current study is part of a larger-scale study on children and advergaming in Flanders, the Dutch-speaking part of Belgium. Prior to data collection, all principals and teachers from the selected schools were asked for permission. We also obtained informed consent from the children and their parents. Parents were informed about the study twice. Prior to the first phase, parents were informed that a study was being planned in their child's school. This letter was accompanied by the first consent form. After the study, parents received another letter explaining the study and its purpose in more detail. This letter was also accompanied by a consent form. Consequently, even after the data collection, parents had the option to remove their child's answers from the dataset. The children were also informed about the data collection twice. Before the study, the children received verbal information about the study but the full purpose of the study was not revealed in order to avoid priming. They were also informed that they could opt out at any moment of the study. After the data collection, the children received a written consent form stating that they had participated voluntarily and that they had given permission to the researchers to use their data. The language used in this consent form was appropriate to the age group.

Data were gathered amongst children aged 10-12 years old in the school's computer lab. Two researchers were present at the time of the data collection. In all, 200 children from two schools (44.7% boys, and 55.3% girls) took part in the experiment. The mean age of the respondents was 11.03 years. The children were invited to play an advergame for approximately five minutes, after which they completed a questionnaire about topics such as persuasion knowledge, emotions towards the game and flow experience (see measurements below). Due to practical issues, the questionnaire was administered in a class setting, where approximately 12 children (half of the class group) were playing the advergame at the same time. Children were able to ask questions about the game and questionnaire at any time and every question was answered individually. However, the participants were explicitly instructed not to talk to their classmates while playing the game and to fill in the questionnaire on their own. This instruction was given in order to avoid socially desirable answers. Afterwards, the participants were debriefed about the purpose of the study. During a short

class discussion, the full nature of the experiment was explained and the children were given more information on internet advertising. This research study was approved by the Ethics Committee of the University of [Reference and registration number removed for purposes of blind review].

Stimulus materials

For the purpose of this study, an advergame was designed. Brand selection was based on a pretest in which we measured product involvement and prior brand attitude. We do not focus on these variables here, however, since they are not central to our research hypotheses. Based on existing advergames, we adjusted an adaptable Flash game template (see Figure 2 for a screenshot of the game). This template is a simple platform game. Similar platform games are used in 'real-life' advergames (e.g. by the brand Dr. Oetker). The advergame used in our study was constructed to fit the abovementioned definition of advergaming from An and Stern (2011). Our game was interactive and incorporated a brand logo and a product. The goal of the game was to catch ice cubes. Respondents had to use the arrows on the keyboard to move forward or jump. Brand images were integrated throughout the game so that it appeared to have been designed specifically for that brand. The brand was shown prominently in the background, while images of the product were used as stepping stones. In other words, the product and brand were essential to the gameplay. Furthermore, the game was simple and easy to play. These aspects fit the characteristics of advergames as described by An and Stern (2011), Cauberghe & De Pelsmacker (2010), Culp et al. (2010), Dahl et al. (2009) and Hernandez and Minor (2011).

Insert Figure 2 about here

Measurements

Emotions. In our survey, we included three nine-point visual scales (the *Self-Assessment Manikin Scale or SAM*). Participants were asked to indicate the level of pleasure, dominance and arousal they had experienced during advergame play. The SAM scale is based on the PAD dimensions (Russell and Mehrabian, 1977), and it is frequently used to measure emotion in research on gaming (Poels, et al., 2012) and on advertising (Morris, 1995; Poels and De Witte, 2008). The instrument has been identified as an inexpensive, non-demanding method for performing quick assessments of the emotions of participants (Bradley and Lang, 1994). Furthermore, the scale has been found to be suitable for children, especially since it makes use of pictures (McManis, Bradley, Berg, Cuthbert & Lang, 2001).

Flow. We used a scale based on the Kids Experience Gaming Questionnaire (KEGQ) (Poels, Ijsselsteijn and de Kort, 2008). The flow scale consisted of three items: (1) '*I forgot everything around me'*, (2) '*I was totally absorbed in the game'* and (3) '*I paid careful attention during the game'*. Each of the items was measured using a five-point Likert scale ranging from 1 (*not at all*) to 5 (*a lot*). This scale provides a one-dimensional, simple and direct report measurement of flow. It is especially suitable for use in research with young respondents since it is developed to be child friendly, both in wording and format (Poels et al.,

2008). Principal component analysis with these three items yielded a single factor (EV= 1.98, R^2= 0.66).

Persuasion knowledge of advergames. Based on previous research (An and Stern, 2011; Rozendaal, et al., 2010; Tutaj and van Reijmersdal, 2012), we developed an eight-item scale to measure the children's understanding of advertising intent. Four items referred to selling intent (e.g. 'the aim of this game is to sell this product'), and four items referred to persuasive intent (e.g. 'the creator of this game wants to influence my ideas about this product'). Each of the items was measured along a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Principal component analysis confirmed that the eight items referring to persuasive and selling intent loaded on a single factor (EV= 3.92, R^2= 0.49). The reliability of this persuasion knowledge scale was good (Cronbach's alpha = 0.84, M = 3.2, SD = 0.88). Consistent with prior studies (e.g Tutaj and van Reijmersdal 2012), the eight items were summed and divided by the total number of items.

Data analysis

We performed structural equation modelling (SEM) with maximum likelihood estimation in Mplus (Muthén and Muthén, 2010) to examine the relationships between self-reported player emotions, flow and persuasion knowledge. The analyses were performed in the following way. First, we built a measurement model and examined whether the observed variables provided a reliable reflection of the latent variables (i.e. flow and persuasion knowledge). Second, we estimated a structural model with the three self-reported player emotions (i.e. pleasure, arousal and dominance) as predictor variables and with flow and persuasion knowledge as endogenous variables. The age and gender of the children were included as covariates in the model.

RESULTS

The initial measurement model provided an acceptable fit, with the exception of an RMSEA value of .093. To improve the model, we allowed an error covariance between two similarly worded items (Items 1 and 2) for persuasion knowledge (the items are presented in Table 1). Thereafter, the measurement model provides an adequate fit for the data $\chi2(42) = 97.22$, $p <$ .001; CFI = .92, RMSEA = .08 (CI: .06 - .10), SRMR = .06. All factor loadings are significant and above .47 (see Table 2). The correlations among all constructs are presented in Table 3. All associations are significant, with the exception of the associations between pleasure and persuasion knowledge, between arousal and persuasion knowledge, and between dominance and arousal.

Insert Table 1, 2 and 3 about here

Structural model

Figure 3 presents the results of the structural model, including its standardized regression coefficients. In addition, the standardized parameter estimates as estimated by Mplus are also included. The results of the fit statistics indicated a good model fit, with $\chi2(90) = 151.87$, $p <$ .001; CFI = .92, RMSEA = .06 (CI: .04 - .08), SRMR = .06. Our analyses reveal that self-

reported pleasure (β = .24, $p < .01$) and arousal (β = .18, $p < .01$) are significantly related to flow, but self-reported dominance (β = -.08, ns) is not. These results thus indicate that participants who report having more pleasure and arousal during game play also experience a higher state of flow during game play.

Flow (β = .20, $p < .05$) is significantly related to persuasion knowledge, indicating that greater flow is associated with greater knowledge of the game's persuasive and selling intent. This is contrary to our expectations in hypothesis 1.

Self-reported pleasure (β = -.07), dominance (β = .14) and arousal (β = -.04) are not significantly related to persuasion knowledge. Neither of the covariates of age and gender are significantly related to flow and persuasion knowledge, although age is significantly related to self-reported pleasure (β = 35, $p < .001$), with older children reporting more pleasure.

Insert Figure 3 about here

DISCUSSION

The central aim of this study was to investigate the association between self-reported player emotions, flow and persuasion knowledge. To the best of our knowledge, no study has applied the PAD dimensions of emotions in the context of advergaming and children. As mentioned above, however, advergames are designed to persuade on an emotional level (Nairn and Hang, 2012). Nevertheless, emotions aroused by advergames are rarely discussed in debates concerning children and advergames. Furthermore, additional research is needed with regard to such game-related variables as flow, and persuasion knowledge. Such information could allow new insights with regard to factors that influence persuasion knowledge towards advergames among children. Our results indicate that the experience of flow is positively associated with children's persuasion knowledge. This result is contradictory to the hypothesis of Waiguny and colleagues (Waiguny, et al., 2012) that enjoyment and flow do not motivate players to pay attention to negative elements in the game, such as commercial content within the game. Furthermore, the PCMC model does not explain our results. We assumed that flow would have a negative effect on children's persuasion knowledge but in fact we found a positive effect. It may be that advergaming does not involve primary and secondary tasks, since the persuasive message is in fact the advergame itself. Researchers often refer to advergaming in terms of blurring the boundaries between entertainment and commercial messages. As a result, the PCMC model may not be suitable for explaining why flow has a positive effect on children's persuasion knowledge, since the PCMC model assumes two tasks, one focussing on the context and the other on the persuasive content (Buijzen et al., 2010). Still, we can explain our result by combining the theory of flow with the theory of limited capacity, if we assume that playing the advergame and understanding its intent are not separate tasks. One crucial condition for achieving a state of flow is an ideal balance between an individual's own skills and the skills needed to complete

the activity (Csikszentmihalyi, 1977). If this condition is met, children have enough cognitive resources left to reflect on the game's intentions, in contrast to children who are not 'in the flow'. This explanation can be supported further by the theory of limited capacity, which states that processing information requires mental resources (Lang, 2000). Therefore, children experiencing flow while playing the advergame are allocating resources to the commercial message, as this persuasive message is essential to the game play.

The results of this study also demonstrate that the state of flow during advergame play is associated with self-reported pleasure and self-reported arousal. We can therefore conclude that the feelings of pleasure and arousal while playing an advergame are important predictors of the flow state. Contrary to our expectations, the self-reported feeling of control is not related to the experience of flow in advergaming. One possible explanation for this finding is that our advergame was relatively simple and easy to play, even for children with limited gaming skills. Finally, none of the PAD dimensions of emotions was related to the level of persuasion knowledge. This result indicates that emotions towards an advergame do not influence persuasion knowledge towards the same game.

Despite well-considered preparation, we acknowledge that our study is subject to several limitations. First, we used self-reported measures of emotion after game play, which might have been affected by social desirability bias (Hernandez and Minor, 2011). In addition, the self-reported measurement of emotion could be seen as a perception of emotional reaction (Poels and Dewitte, 2006). Future studies on flow, emotions and persuasion knowledge towards advergames could incorporate other measurements of emotion, including physiological data (e.g. skin conductance), in addition to the self-reported measurements used in this study. Second, our study focuses on persuasion knowledge as a dependent variable. Nevertheless, emotions and game flow might also influence aspects related to advertising effectiveness. Future studies investigating advergame-related emotions and flow might consider focusing on attitudinal aspects (e.g. attitude change after game play) and behavioural intentions (e.g. purchase intention and pester intention).

Third, future studies might consider taking into account children's gaming skills as an antecedent of flow, in order to deepen the investigation of the applicability of the theory of limited cognitive capacity to advergaming and flow. Finally, this study focuses only on the theory of limited capacity and the PCMC model. Future studies could further investigate children's executive functioning skills (i.e. children's ability to control their thoughts and actions). For children, these skills are not yet fully developed (van Reijmersdal, et al., 2012; Moses and Baldwin, 2005), and this can make it more difficult for them to understand the game's persuasive intent.

Regardless of its limitations, our study has several implications. The most important implication following our results is that game-related aspects like game flow influence the extent to which children understand the game's intent. The relationship between game flow and persuasion knowledge indicates that a child's mental state is important with regard to the elaboration of advertising. More particularly, our research suggests that children who experience a state of flow during game play, are better equipped to deal with the commercial

aspect of the advergame. This finding goes further than consumer socialization theories, which group children merely based on age. In other words, our findings confirm that, in addition to age, other factors are important to understand the persuasive intent of advertising. This also indicates that the understanding of the persuasive intent might differ between different advergames, as not every advergame will induce the same level of flow. Furthermore, players who are in a state of flow have a good balance between the skills needed to play the game and their own gaming skills. Our study indicates that when this balance is reached, children have a higher understanding of the persuasive intent of advergaming. We might ask whether players with a higher skill level are better equipped to deal with the commercial aspects of advergames. If this is the case, then advertising literacy interventions aimed at increasing children's persuasion knowledge should focus not only on content, but also on children's internet skills, particularly gaming skills. Future research focusing on skill level should go deeper into this issue to verify this hypothesis. For example, additional studies might focus on differences in persuasion knowledge between experienced game players and non-experienced game players. In addition, an intervention study could compare the effects of advertising literacy training that includes or excludes general computer and gaming skills. Another implication of our research is that emotional aspects (e.g. arousal and pleasure) also affect the flow state of the player. For marketers, this means that, in addition to being entertaining, games should provide enough excitement to bring children into the favourable state of optimal experience.

The concept of flow is also important from an ethical point of view. Despite the fact that persuasion knowledge does not always guarantee that this knowledge will be used against persuasion attempts (Mallinckrodt and Mizerski, 2007), targeting children is still considered 'unfair' unless children understand the persuasive intent of advertising (Nairn and Hang, 2012). Our study implies that a child experiencing a state of flow is likely to have a better understanding of the game's intent. In sum, our findings suggest that when the challenge posed to the child is in balance with the child's capacities, the child will be better equipped to deal with persuasion attempts included in the advergame. Further research is needed in order to identify other factors that are associated with children's persuasion knowledge and how these factors can be influenced. Nevertheless, our findings contribute to the current academic and public debate on children, persuasion knowledge and advergaming.

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TABLE 1

Descriptive statistics for the indicators

	M	*SD*	*range*
Self-reported pleasure	7.19	1.58	1 - 9
Self-reported dominance	6.44	2.11	1 - 9
Self-reported arousal	4.88	2.34	1 - 9
Flow			
Item 1: I forgot everything around me.	2.91	1.47	1 - 5
Item 2: I was totally absorbed in the game.	2.91	1.36	1 - 5
Item 3: I carefully paid attention during the game.	3.73	1.09	1 - 5
Persuasion knowledge			
Item 1: This game wants to encourage the purchase of this product.	2.66	1.31	1 – 5
Item 2: This game tries to encourage the sale of this product.	3.33	1.25	1 – 5
Item 3: The goal of this game is to sell this product.	3.19	1.29	1 – 5
Item 4: The creator of this game wants me to buy this phone.	3.31	1.37	1 – 5
Item 5: The creator of this game wants me to have a good attitude towards this product.	3.18	1.19	1 – 5
Item 6: The goal of this game is to make me like this product.	3.18	1.23	1 – 5
Item 7: The creator of this game wants me to feel good about this product.	3.35	1.31	1 – 5
Item 8: The creator of this game wants to influence my ideas about this product.	3.15	1.11	1 – 5

TABLE 2

Measurement model: Standardized and unstandardized parameter estimates

Observed variable	Latent construct	β	B	Two-tailed *p*-value
Item1_F	Flow	.713	1.000	.000
Item2_F	Flow	.923	1.205	.000
Item3_F	Flow	.477	.498	.000
item1_PK	Persuasion knowledge	.481	1.000	.000
item2_PK	Persuasion knowledge	.620	1.336	.000
Item3_PK	Persuasion knowledge	.620	1.426	.000
Item4_PK	Persuasion knowledge	.539	1.055	.000
Item5_PK	Persuasion knowledge	.516	1.187	.000
Item6_PK	Persuasion knowledge	.742	1.631	.000
Item7_PK	Persuasion knowledge	.801	1.803	.000
Item8_PK	Persuasion knowledge	.733	1.752	.000

TABLE 3

Correlations among the constructs

		1	2	3	4
1	Pleasure				
2	Dominance	.21**			
3	Arousal	.14*	-.01		
4	Flow	.35***	.13*	.20**	
5	Persuasion knowledge	.03	.16*	-.01	.17**

Note: *$p < .05$, **$p < .01$, ***$p < .001$

FIGURE 1. Conceptual model

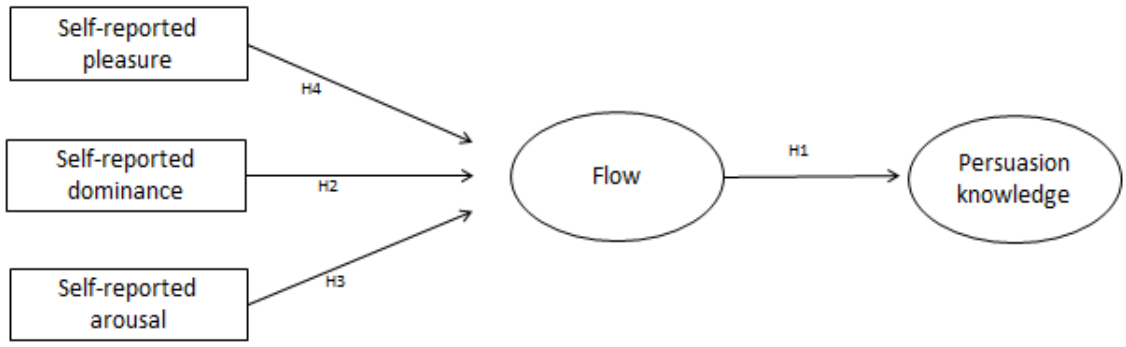
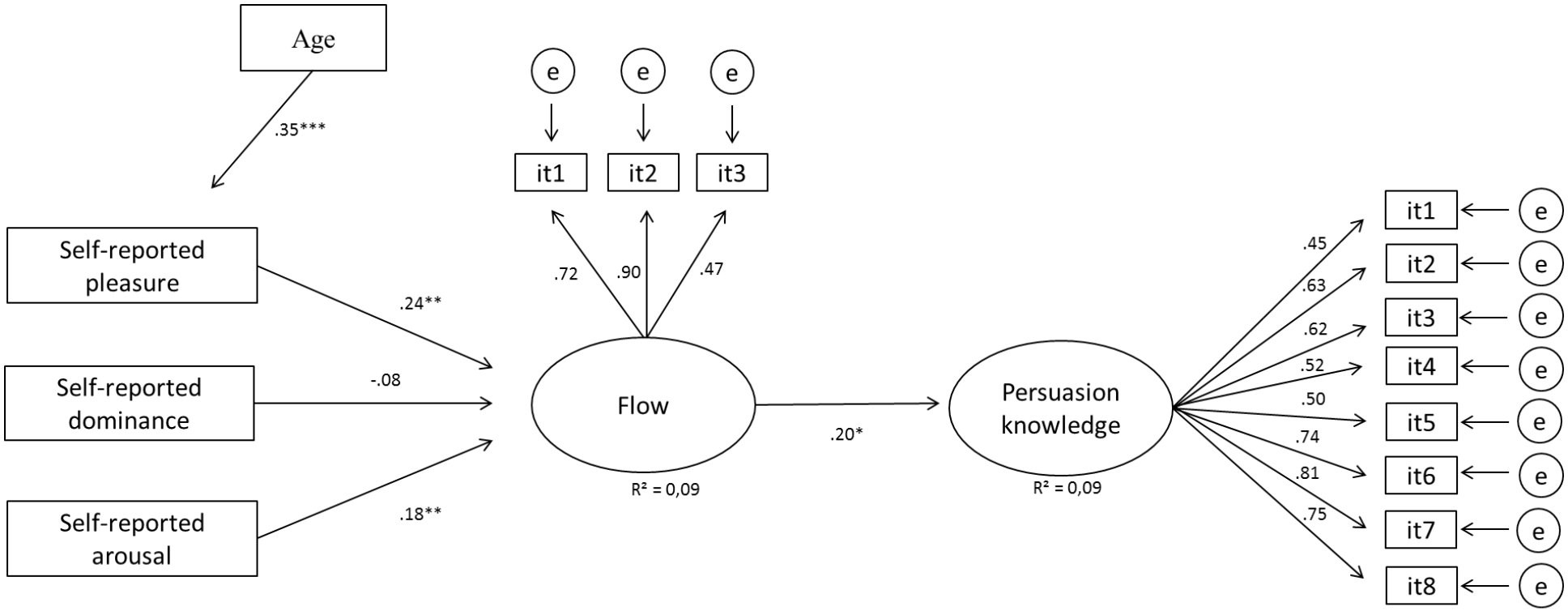


FIGURE 2. Screenshot of the game

FIGURE 3. Results of the structural model



Note: All reported coefficients are standardized values, adjusted for the influence of covariates. Non-significant paths are not shown. *$p = 0.05$; **$p < 0.01$