Viewers’ Experiences of a TV Quiz Show with Integrated Interactivity

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This article presents the findings of the audience research conducted on the cross media Multimedia Home Platform (MHP) and Mobile Java-based interactive play-along TV game show Enigma. The show was developed as the first Finnish TV game show with fully integrated, synchronized interactivity, allowing the audience to participate in the show either by a Java-based mobile phone or by an MHP set-top box. The results show that the viewers’ behavior during the show and involvement in the game varied depending on whether they participated with friends or alone. Furthermore, MHP-based interactivity proved to whet the viewers’ appetite the most, whereas interactivity in general was appreciated by the participants. Viewers enjoying the passive version also took an interest in the interactivity. Eighty percent of the viewers, women in particular, found it easy to participate in the quiz show, although the interactivity stole a great deal of time and attention from the video content. The important finding is that the interactivity added value to the viewing experience and made it more exciting, involving the audience. Eighty percent of the interactive viewers were in favor of more interactive programs on television and thus stated their interest in participating in future interactive TV programs.

1. INTRODUCTION

The pursuit of enjoyable experiences and amusement is by no means a recent phenomenon; it has played a predominant role in human societies throughout history. An early form of entertainment was playing board games, such as the Go game board invented in Japan in 2000 B.C. Live events were a popular way to fill one’s time with fun in 100 to 300 A.D. People in southern Europe, for example, found amusement in chariot races, Olympic Games, morality plays, and touring performers. The Greek philosopher and scientist Aristotle acknowledged about 2,300 years ago that mimesis, or “imitation of an action,” is an essential part of human nature, granting human beings knowledge. According to him, all human beings find pleasure in drama (Aristotle, 2000). Neither is interactive
entertainment a novel invention, even though it is receiving a lot of attention today—note, for example, the popularity of computer and video games. The gladiator performances held in ancient Rome had interactive features, as the audience could influence the destiny of the fighters, in the sense that they could decide whether the gladiators lived or died.

In modern society, entertainment is very much abundant, ubiquitous, and easily accessible. Some label these times as the Entertainment Age, referring to the omnipresence of entertainment (Vorderer, 2001). The fun-oriented, 21st-century consumers looking for pleasurable excitement may choose from a vast spectrum of performances, media, and experiences, and they do. The taste of the TV audience and the evolution of the mobile phone may serve as illustrating examples. A study on German TV viewers found that the televised content has turned more entertaining the last decade, and moreover, the audience’s interest in televised entertainment has increased (Vorderer, 2001). In addition, the telephone, once merely a tool for communication, has now evolved to a veritable media center with integrated media components such as music players and cameras. As a consequence of the media user's search for fun and diversion, entertainment is a fast-growing sector of the global economy. In the United States, there is currently a high growth in the consumer end-user spending on media, such as the interactive television and the Internet. Expressed in figures, the counter stops at $186.30 billion in 2004 and an estimated $199 billion in 2005. The disbursement of the American consumers on media is forecast to increase at an annual rate of approximately 6% over the upcoming years, whereby the average annual consumer spending is estimated to enter the threshold of $1,000 in 2009 (Communications Industry Forecast Highlights, 2005).

The Finnish media users also exercise their right to be entertained (Sayre & King, 2003), a fact revealed by the high saturation of media equipment. For example in the year 2005, all but 7% of Finns owned a TV set, nearly every other had a DVD player at their disposal, one in four owned a game console of some kind, and mobile phones were an intrinsic part of the Finnish life, as 95% of the population owned one. WAP, GPRS, and 3G-phones constitute 38% of that figure (Statistics Finland, 2006a). In November, 2007, 88% of the TV households in Finland possessed a set-top box (Finnpanel 2007). The average Finn spends in general 2 hr 49 min a day watching TV. The consumption of televised content has increased by 29 min in the last 10 years. When adding video and DVD consumption to this, the average Finnish viewer spends 3 hr 4 min in front of the television each day (Statistics Finland, 2006b), a figure that has increased by 34 min in a decade.

In late 2004, Finland’s first interactive television (iTV) format with fully synchronized and integrated Multimedia Home Platform (MHP) and Mobile Java interactivity, Enigma, was aired. This cross media play-along game show format was developed by MediaCity at Åbo Akademi University, together with Sveng.com Production Ltd (Svarvar, 2004). The objective of the program, whose target audience is the 20- to 35-year-old age group, is that two teams in the studio compete against each other by answering trivia questions during four rounds. The audience may also participate in the interactive quiz show through a mobile phone supporting Java, or with a MHP set-top box and its remote control. MHP is an open middleware system standard designed by the Digital Video Broadcasting
project for interactive digital television. The MHP enables the reception and execution of interactive, Java-based applications on a set-top box.

In Enigma, the interactivity is completely synchronized with the broadcast, permitting the viewers, while playing along in three of the rounds consisting of 11 questions, to contemplate the questions and give their answers at the same time with the teams in the studio (see Figure 1). The MHP application included can be considered an add-on application as defined by Holmlid, Arvola, and Ampler (2000), as it provides information in parallel with the broadcast. The first 12 shows were broadcast on YLE FST, the Finnish National Public Service Broadcasting Company’s Swedish channel, in late 2004. The second season aired in the autumn 2005.

In this article, we bring forth the audience research study that was conducted on this interactive game show in May and June 2005 in the iDTV Lab’s audience research laboratory at Åbo Akademi University in Vaasa. One episode of Enigma was included in the study (Episode 8, Season 2), this episode was originally aired in the autumn of 2005 (Svarvar, 2005). As the collected data are vast, the spotlight is focused mostly on the interactivity, from the perspective of viewing experience. First we present the purpose of the study. Subsequently we proceed with a short outline of earlier research on interactive entertainment and on the definition of enjoyment and entertainment. This is followed by the research disposition and the discussion of methods. Ultimately, the main findings concerning the interactivity and viewing experience are presented.

2. THE PURPOSE OF THE AUDIENCE STUDY

Assigned by the developers and producers of the game show Enigma, the iDTV Lab evaluated the audience’s appreciation and enjoyment of the program. The overall goal of the study was to investigate if and how Enigma benefits from interactivity and, from the audience’s perspective, to assess whether the viewing experience is ameliorated when the person in front of the television is participating.
in the story unfolding on the screen. This endeavor also included a comparison to identify whether there is any difference when the interactivity is used in a social context. As a part of the study, the TV format itself was also evaluated, as well as the suitability of the methods employed in the study.

The concrete research question was twofold. On one hand, we set out to investigate the characteristics and differences in the way of viewing the TV show, with interactivity using a mobile phone or a MHP set-top box, or without interactivity. On the other hand, as a complement to statistics on how many viewers watched the show, the issue of the enjoyment of the show was addressed by collecting the target group’s opinions of the TV format.

The concept of interactivity is disputed as it refers to different phenomena and is differently interpreted depending on the science (Richards, 2006; Stromer-Galley, 2004). In our study, interactivity denotes user interactions with the set-top box and the broadcasted content. This interpretation is quite close to the one proposed by Gawlinski (2003):

Interactive television can be defined as anything that lets the television viewer or viewers and the people making the television channel, programme or service engage in a dialogue. More specifically, it can be defined as a dialogue that takes the viewers beyond the passive experience of watching and lets them make choices and take actions. (p. 5)

We study in detail the user experiences derived by iTV in the eyes of the viewers. The results of the study were to be used both by the TV format developers to create TV formats as viewer friendly as possible and by the researchers at iDTV Lab for academic purposes. Our study is a client-commissioned project; in addition, it serves as a prestudy and pilot for a later PhD project. Thus, one foot of this audience research stands firmly on academic soil, whereas the other stands on the industry domain. However, employing the measuring stick of Gunter (2000), our study lands closer to the category “academic affective research” rather than “industry-driven affective research” (p. 136). The former aims at understanding how audiences relate and respond emotionally to different types of media content during the consumption. The latter, however, refers to research conducted by media industry bodies to identify new measurement systems or fine-tuning present ones, or measurement of the enjoyment of media content in the eyes of the audience on a regular basis (Gunter, 2000; Hagen, 1999).

3. THE NATURE OF ENTERTAINMENT

In this article, the TV viewer’s experience of entertainment is studied. Etymologically, the word entertainment reveals its Latin roots, as it derives from inter (among) and tenere (to hold). This equals “to hold the attention of” or “agreeably diverting” (Sayre & King, 2003, p. 1). From the entertainer’s perspective, entertainment has come to refer to a constructed product designed to stimulate a mass audience in an agreeable way in exchange for money. This experience can be either live or mediated. Entertainment is always created on purpose by someone for someone else, and its primary purpose is to attract audiences and to offer
pleasant and occasionally unpleasant emotions. From the pleasure seeker’s perspective on the other hand, entertainment is not so much associated to certain products or features but rather to the responses to it, the enjoyable experience one feels when consuming entertainment. At the core of the entertainment experience stands a “pleasant” experiential state, also termed *enjoyment*, which includes physiological, cognitive, and affective components, as Vorderer, Klimmt, and Ritterfeld (2004) have written (p. 393). The key ingredient to entertainment seems to be that something that keeps us entertained makes us *feel* something (Sayre & King, 2003). In general, the media entertainment user seeks to have a good time (Vorderer et al., 2004).

Experiencing enjoyment, or “being entertained,” is manifested in several ways, such as a sense of suspense, competitiveness, and achievement. Behavioral expressions as well are manifestations of enjoyment, like laughter and serenity, and psycho-physiological expressions such as changes in electrodermal activity (Stern, Ray, & Quigley, 2001). The physiological signs of a viewer being entertained may be increased heart rate and elevated skin conductance tonic levels (Lang, 1994; Stern et al., 2001). By measuring the changes in skin conductance and heart rate, it is possible to get information on the viewers’ attention, arousal, effort, and emotion. It is thus possible to analyze what the audience is experiencing, thinking, and feeling without needing to interrogate the audience members (Backholm & Lindqvist, 2004; Lang, 1994; Stern et al., 2001). Affective and cognitive manifestation of feeling entertained may be a sense of suspense and relief, serenity, tenderness and sadness, or laughter. As such, we chose to employ a blend of methods in this study, as discussed further on in the article.

What is of interest in our analysis is the cause of the feeling of enjoyment. Why does a TV consumer find the content pleasurable, whereas another does not? Just as it takes two to tango, both the viewer and the content producer have certain requirements to fulfill to achieve entertainment of the audience. According to Vorderer et al. (2004), researchers in many fields have defined some conditions that need to be fulfilled. First, the TV viewer, or any other media user, needs to be able and willing to set aside disbelief and regard the narrative on screen as true. Further, the media user has to feel empathy for the presented characters and be willing to relate to them. These interactions are often called *parasocial* and could develop between the news anchor and the viewer or, as in our case, between the game show host and the viewer. The sense of being present in the story is also a must to have the enjoyable experience, as in the user’s interest in the topic, problem, or knowledge domain being presented. Concerning the media content producer, there are two main prerequisites identified by researchers. On one hand, there are the design and the technological features, such as usability; on the other, there is the user’s sense of a personal relevance or meaning brought by the media content.

When attempting to define the enjoyment and the sense of entertainment the TV content generates, one must, however, take into consideration that the scenery has changed fundamentally in one aspect over the last decades. From being merely spectators, enjoying only what was broadcast from one content producer to many viewers via the television, the audiences are now increasingly characterized by activity and engagement, with a broad range of interactivity modes to choose
from (Jensen, 2005). One step toward a more active role was including the listeners in radio talk shows and young viewers in iTV programs, such as the first iTV program, *Winky Dink and You*, where the audience’s participation was of great importance (Gawlinski, 2003; Smith, Stewart, & Turner, 2004). A recent dimension of the greater activity on the part of the viewers is interactivity in the living room via a set-top box with a return channel. Because of this dynamic change in TV consumption (i.e., the transformation from a passive, linear viewing experience to a more engaging, interactive one), the power and control is increasingly handed over to the audience.

In this context, the question whether the TV viewers want to be interactive or not when they are watching television rises. Traditionally, mood regulation and a temporary escapism from a dull or tough everyday life have been regarded as motives for media consumption, but these do not necessarily apply to interactive media, as interactive media demand more input from the audience than do non-interactive media. Reasons for being interactive are said to include a desire to compete, achieve goals, and challenge oneself or others (Grodal, 2000; Vorderer, 2001). Without the possibility of interactivity, the audience follows, without taking part in, the story unfolding on the screen. This seems to be an important prerequisite for the emotional participation of the viewer. It appears, however, that being interactive does not prevent involvement, suspense, and enjoyment, which highly contribute to a pleasant media experience. According to Vorderer (2000, p. 30) this is because of the more complex structure within which interactive media use occurs. Interactivity requires the audience to be active and to concentrate on what to do next, and the media users must decide on how to act instead of “only” observing what is shown on the screen. This may have an impact on the viewer’s self-esteem and well-being. Not only does the viewer have an influence on the story, the self-image is affected as well. It appears that users of interactive television have two roles: the role of a witness and of a participant or player (Vorderer, 2000, p. 31). These two roles may also function as separate psychological processes.

Considering the increasing range of interactive media content available for consumers, the question arises whether the users actually enjoy these experiences and the active part they play. It has been assumed that the younger generation knows how to use the new media to its full potential and that they find the old media boring. On the other hand, the older generations are overwhelmed by this new type of media. Studies have shown that well-educated young people with a high income are particularly attracted to interactive media. Older people who are confronted with new media seem to object to them. In a test conducted by Vorderer (2000) with an interactive movie, it was found that the information elite, meaning the people who had a degree and who had a higher cognitive capacity, were eager to interactively watch the movie. Those who had not graduated and were slow in their decision making disliked the opportunity to interact. They preferred to watch the noninteractive version of the movie instead. The conclusion from this test was that more cognitive capacities and a higher education lead to a more positive evaluation of interactivity. Fewer capacities and the lack of advanced education lead to more distress, and thereby to a more negative evaluation of interactivity. Other factors influencing the appreciation of interaction have been
identified, such as the degree of selectivity (Sayre & King, 2003, p. 91), and the competitive elements and challenges (Vorderer, Hartmann, & Klimmt, 2003). The competitive element seems to be of value, which has been found, for example, in a test on an iTV quiz show (Holmlid et al., 2000) where the results indicated that social competition and especially the possibility of social challenge are important in iTV quiz shows.

Although parts of the future audiences probably will not select and modify what they watch on television, many viewers will most likely choose to exercise influence on the content of the TV broadcast, as many do already today. It is known that traditional media users usually seek an enjoyable experience without investing too much ambition and energy in the experience. Interactive media users, on the other hand, hunt for challenges to pleasure the senses in an agreeable but sometimes even distressing way and look for achievements; therefore they choose content that promises to be challenging (Vorderer et al., 2003). Thus, the question whether the entertainment experience is intensified or diminished when the audience has the possibility to interact with the media emerges. This is was the main question we had in mind when setting out to shed light on the incitement of choosing interactive entertainment and what possible rewards it may grant to the viewer. Before the presentation of the audience study setup and results, a short outline of the methods employed follows.

4. METHODOLOGY

A large number of studies have been conducted on audiences’ affective responses to media and television (e.g., Alasuutari, 1999; Gunter, 2000). Most of the academic research in this field has been primarily interested in whether certain media content (e.g., violence) causes upsetting emotional reactions for children and adults (Gunter, 2000, p. 162). As for knowledge on iTV and consumers in particular, research has hitherto to a large extent focused on issues of usability, design, and logical navigation (Richards, 2006).

The methodology in similar, earlier studies included both quantitative and qualitative methods, be it online (measuring while exposed to media content) or off-line measuring (measuring the audiences’ opinions after the viewing), as well as in laboratories and in “natural” settings.

As this is a study in which the object of study and the independent variable is an iTV game show and the dependent variable is the experience of being interactive, we decided to employ a complex blend of both qualitative and quantitative methods to get the most vast and reliable data possible. Such a combination is considered to be a powerful and desirable one when measuring audience’s opinions about TV programs (Gunter, 2000; Schröder, 1999). In addition, in line with Vorderer et al. (2004), we conceptualize the enjoyment of a TV viewer as a complex construct that includes emotional, physiological, and cognitive dimensions, which calls for a combination of methods.

As the research questions concerning interactive digital television differ from those of traditional, lean-back model TV, some kind of melting pot of different methodologies and methods is often necessary to fully comprehend the character
and impact of the interactivity (Rasmussen, 2005). Because *Enigma* is based on synchronized mobile Java interactivity, it is even possible to participate in the show without sitting in front of the television when the show airs. As long as one has a mobile phone supporting Java interactivity, one can participate even when on the move simply by answering the questions that appear simultaneously on the mobile phone screen and on the TV screens of the viewers at home. However, this kind of audience was not considered to be popular. Instead, the starting point was that the viewers throughout Finland are exposed to the show through a television set in their homes. Therefore, we decided to conduct the study in a living room setting where the participants were exposed to the interactive, televised content.

There were two possible ways to undertake the research—by conducting the study either in a “natural” setting by asking the viewers to watch the show in their own homes or in an experimentally constructed environment in the iDTV Lab’s audience research laboratory, which comprises five living rooms with a couch, armchairs, carpets, and tables. However, the unknown setting and the technical laboratory milieu might have had an influence on the participants and on the results. As opposed to observations in natural settings, where the viewer would be exposed to contextual factors calling for the viewers’ attention, these factors are eliminated in the laboratory environment, perhaps creating an unnatural context in an unfamiliar setting (Figure 2). The ethnographic approach is said to reveal how people actually use and watch TV in a familiar context (Eronen, 2004). The laboratory setting on the other hand might be better suited for studying the cause and effect with supervised mechanisms and with exactly the

![FIGURE 2](image-url) The setting of the study in the laboratory. The eye tracking camera, recording the viewers’ gaze during the show, was placed in between the knees where as the surveillance camera is to the left. A photoelectric plethysmograph for measuring blood flow and electrodes for measuring skin conductance was on the person’s left hand.
variables the researcher is interested in; this might, however, have an influence on
the participants and on the results.

Yet, because the goal was neither to conduct an ethnographic study nor to
investigate patterns of use or the significance of TV consumption, the laboratory
alternative was considered plausible. Furthermore, because of technical reasons
of broadcasting it was not possible to conduct the study in the participants’
homes. Instead the broadcast was adapted to every test session in the laboratory.
Several measures were naturally taken to get the participants accustomed to the
surroundings. Before the test, the evaluators played a simple game on the MHP
set-top box and/or the mobile phone. The mission of such action was twofold.
First, the viewer had a chance to familiarize himself or herself with the tool of
interactivity to be used in the study. Second, the tension caused by the test situa-
tion and the new surrounding was relieved, which was crucial for the psycho-
physiological measuring.

4.1. Methods

Seven different test groups were created to answer the research questions (see
Figure 3). All manners of watching the program were included, and the different
ways were used in the separate test groups. The study thus was like a quasi-
experimental study where all the different ways of watching the program were
compared. One group of people watched the show individually, with no interac-
tivity; another group watched the MHP version of the program individually; a
third group played the Mobile Java version of the program individually; and a
fourth group tried all ways of watching the program individually (no interactiv-
ity, MHP interactivity, and Mobile Java interactivity). Three groups consisting of
families or friends were also included in the study. The first group watched the
program together without interactivity, the second group watched the show with
MHP interactivity with one remote control, and the third group watched the
show with Mobile Java interactivity. In this group everyone had a personal
mobile phone. The definition of different test groups made it possible to compare

\[ \text{FIGURE 3} \quad \text{Seven test groups were defined in the study based on all the different}
\text{ways the program could be watched.} \]
the results and to assess the impact of the different forms of interactivity available and the effects of using interactivity in a group or individually.

The question of how enjoyable the viewing experience was—both with and without interactivity—according to the target audience was answered by blending quantitative and qualitative methods, such as eye tracking, psycho-physiological measuring, questionnaires, and semistructured interviews (see Figure 4). When studying the interactivity of the program, the following subgenres were employed: usability (e.g., design and technological features), enjoyment (e.g., suspense and tension), involvement (e.g., behavior depending on whether the viewer participates alone or in a peer group), appeal (e.g., interest in participating again, attitudes toward iTV), and effort (e.g., costs, rewards for participating). Similar genres were identified as core dimensions of game shows and quizzes in earlier studies of television programs (Gunter, 2000). Before the actual user tests, a pilot test with two persons was conducted where the research questions were refined and narrowed down to the aforementioned mentioned areas.

As for the usability, it was considered that the traditional, established methods of investigating the functionality and user-friendliness of technologies and applications do not instantly apply to interactive digital TV (Thomas & Macredie, 2002). This is because of different use scenarios and use environments that usability testing has not faced before. In our study the special use scenarios of an iTV show were considered by having some evaluators watch the show in a group of peers, as Enigma is well suited to be played in a group. The emphasis did not only lie on technical solutions, effectiveness, problems of use, and how easy or hard it is to participate, but also on the experience, appeal, and involvement.

Services for iTV must be easy to use and must be useful to the viewer. The effort the viewer has to put into using the services must be as low as possible. Thus, usability is a very important part of iTV services. The users must feel that it is easy to use such services so that he or she does not need to look too long for information or features. Interactive services also need to be useful, reliable,

**FIGURE 4** Example of eye-tracking data. The dot on the man’s glasses indicates where the viewer’s gaze lies. The tale of the dot coming from the application with the points earned shows the trail of the eyes. © Sveng.com Production Ltd/Åbo Akademi MediaCity.
enjoyable, easy to learn, easy to access and use, and time effective (ArviD, 2005). The degree of appreciation while being interactive was measured both online, during the interaction, as well as off-line.

During the test, a freestanding Tobii X50 eye-tracking camera (Tobii Technology, Danderyd, Sweden) was used (see Figure 2). This eye-tracking system was especially designed for studying TV content. The camera is based on infrared light and tracks a person's eye movements from the distance, being placed between the person's knees, thus limiting the interference during exposure to media content. This, in combination with the recorded TV screen, renders valuable information about exactly where on the screen the viewer has been looking while playing along.

The participants' usage of the remote control and the mobile phone during the test was recorded through video surveillance. A video camera recording the mobile phone or/and the remote control was placed behind the participant and was used throughout the study. This method offers information on usability-related issues. A video surveillance system was also used during the study to record the behavior of the participants. An intercom system was also employed to give instructions to the participants and to record their comments. During the actual viewing of the program, all participants were left alone in the room, without any involvement from the researchers.

Yet another method put to service in this study is the measurement and recording of psycho-physiological reactions. The psycho-physiological data (tracking the changes in skin conductance and heart rate) enabled an analysis of the state of the test participants' interaction with their environment, in this case the TV viewing. Measuring electrodermal activity (EDA) is a useful method to measure the physical reactions to what the viewers watch on the TV screen (Backholm & Lindqvist, 2004; Lang, 1994). Because of activation of the sympathetic nervous system, sweat rises toward the surface of the skin. This activity mirrors both the emotional as well as cognitive responding to stimuli, that is, measuring TV viewers' electrodermal activity provides a glance into the emotional and cognitive activity of a TV viewer (Stern et al., 2001).

The off-line assessment of the opinions of the audience regarding the interactive content and the interactive experience was composed of questionnaires and semi-structured interviews. The participants filled out a postviewing questionnaire in which they were asked to rate the content and the interactivity. As a last step of the study, there were semi-structured interviews, conducted both on groups and on individual evaluators. In about half of the interview cases, the same show that the evaluator had just seen was shown on a screen in the same room, serving as a support for the memory.

5. THE REALIZATION OF THE VIEWING EXPERIENCE STUDY

Nielsen (2000) found that 5 participants in a usability test is a sufficient number, as the knowledge and understanding do not increase by adding more users, as one basically observes the same patterns time and again. Consequently, saturation appears after the 5th user, according to Nielsen. Our audience study was a
client-commissioned project and a pilot for a future research project. It has the character of a usability test where the viewing experience of Enigma is scrutinized and the benefits and disadvantages of interactivity are identified, rather than a study claiming to draw a general conclusion on all iTV shows. Therefore, in line with Nielsen’s guidelines, 35 participants provided us with data for the purpose of the research. Accordingly, in each test group of our study, there were approximately 5 viewers.

Thus, in all, 20 men and 15 women were asked to participate in the study of the TV show. The character and name of the program were not revealed until the actual testing in the iDTV Lab’s audience research laboratory. As the target group of the game show Enigma consists of 20- to 35-year-olds, a majority of the evaluators were younger than 30 (average age=27). Three of 4 of the evaluators lived in a city and had a college education or were college students.

As for the TV-viewing habits of the test participants, a slight majority spend 1 to 10 hr a week in front of the television. Forty percent watched television more frequently, enjoying 11 to 20 hr of televised media content on average per week. A significant difference was found concerning TV viewing habits. The more mature persons in the testing audience watched more television than the younger ones.

One research question concerned the experience of being interactive in Enigma and whether there are any differences in the ways of being interactive in terms of usability, involvement, and appeal. To investigate this, the participants were divided into four groups. There were no specific selection criteria, other than an aim to have the groups consisting of an adequate age spread and balance of the sexes and heavy versus light TV consumers.

Consequently, one group viewed the game show without any interactivity and thus only followed the two competing teams in the TV studio. Another group participated using a Java-based mobile phone, and a third group was interactive through an MHP set-top box and a remote control (Figure 5). A fourth group was both interactive and passive. These evaluators spent the first round of the show simply watching the competitors in the studio. In the second round, they answered

**FIGURE 5** The host of the show explains to the viewers that participation is possible via both MHP and Java interactivity. © Sveng.com Production Ltd.
the trivia questions by using a mobile phone. The participation tool in the third round was switched from the mobile phone to an MHP set-top box. This group tried out all three methods of viewing the show, thus being able to compare them.

Another variable tested in the study was whether the audience watched the program alone or in a peer group. Roughly one third evaluated the play-along game show in a group of family or and friends, whereas others viewed the show solitarily.

6. RESULTS

6.1. Involvement

The interactive viewers watching the game show independently paid careful attention to it. The eye tracker and video surveillance data showed, for example, that the viewers who played along in the game by the set-top box remote control spent in general 73% of the total time of the three interactive rounds watching the TV screen. The remaining time was devoted to the remote control and to looking around the room, perhaps pondering the correct answers to the questions. Moreover, a competitive spirit, both in terms of the winning teams in the studio and to challenge “one’s self,” was evident in many of the test situations.

The noninteractive viewers enjoying the TV program independently, on the other hand, followed the show quite carefully, but many stated in the interview that interactivity would have made the viewing experience more exciting and enjoyable. A switch of channels would have been an option for some of them during their review of the noninteractive content.

In the three groups playing together with friends and family, however, the attention was not always directed to the program, especially not in the group of friends watching the show without participating themselves. In their noninteractive viewing, there was no competitive spirit, and these friends did not discuss with each other which options were likely to be correct. At times, there was rather a lively debate regarding the issue of the question in general and not about the actual question in the show. For example, the question about which type of queue is the worst one, generated a debate on the difficulties of getting through to a telephone company’s customer service via telephone. As a consequence, they sometimes missed some questions or parts of them.

This was not the case in the group of friends, each participating with their own Java-based mobile phone. There was rarely an exchange of opinions regarding the game and never before the end of the 25 sec allocated to answering the question. The behavior was rather individualistic and competitive in this group. Everyone concentrated on his or her own game, being careful not to reveal the strategies of their game play. The success was, on the other hand, well demonstrated, as the players compared the earned points. Short discussions on the questions or the answer alternatives did occur in the group playing Enigma with mobile phones, but the discussion never strayed from the subject or the game situation. The game was quite involved for these competitors.
In the group of a large family playing, there was merely one tool of participation, namely, the remote control. This caused collaboration in the game. The family members did play the quiz show as one team, with everyone contributing to strategy and choices of alternatives. As there were many voices, the discussion never strayed away from the game either. The competitiveness was clearly present in this group.

Having in mind the data just presented, the main findings, from the behavior-focused perspective, are that competitiveness was found in the interactive peer groups playing among friends and family, as presented in Table 1. When there was only one tool to participate with, they competed as one team, with lively debates on the choice of alternatives. When everyone had his or her own device, on the other hand, individual competitions arouse and there were no common discussions on strategies or correct answers. In contrast, the noninteractive group showed a poor competitive behavior.

Another finding was that the time available (25–33 sec) for answering the questions was too short for the group who watched the MHP version of the program together. The individual viewers, in turn, said that they had enough time for answering the questions. On average the individual viewers used only 69% of the available time.

Another finding is that the involvement and attention in the game and the TV program were greater in the interactive than in the noninteractive peer groups. As for the noninteractive viewers, they paid attention to the show, but many of them pointed out later in interviews that they would have welcomed the interactivity as a viewing experience ameliorating factor.

### 6.2. Enjoyment

When setting out to investigate the test participants’ affective responses to the show and its integrated interactivity, we touched on several areas. Using scales of 5, we asked the test participants to assess what emotions and affections the interactivity provoked. We asked them, for example, to rate the degree of enjoyment and excitement interactivity offers to the audience of Enigma.

On a scale from 4 to 10, which is equivalent to the school grades in Finnish schools, all test participants were asked to rate the program. Of all viewers, 66% rated it between 7 and 8, and 26% graded it within the 9 to 9.25 range. This is considered a good result.

Concerning the excitement, it turned out that 66% of the test participants involved in the quiz show characterized their interactive experience as exciting.

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<th></th>
<th>Individual Viewers</th>
<th>Peer-Group Viewers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interactive</td>
<td>Strong</td>
<td>Strong</td>
</tr>
<tr>
<td>Noninteractive</td>
<td>Moderate</td>
<td>Poor</td>
</tr>
</tbody>
</table>

Table 1: The Sense of Competition and Challenge and How it Differed Between the Interactive and Noninteractive Individual Viewers and Peer-Group Viewers
Only 8% of the viewers stated that the interactivity did not offer a stimulating experience. We found a significant difference in this matter, where the younger viewers, younger than 25, found the interactivity more exciting than those older than 25 (p = .05). The reasons mentioned by the interviewees to why the interactivity was exciting were, among other things, the possibility to challenge one’s self and their friends, and that “something always happened” in the show.

Another affective side of interactivity in a TV program is the feeling of being bored or entertained. The majority felt entertained, whereas 17% experienced boredom at times. There was a small difference between the interactive and noninteractive viewers, as the noninteractive participants felt bored more often than those participating in the quiz.

One group in this study tested all the three ways of watching Enigma: watching passively, participating through the mobile phone, and participating through an MHP set-top box. This group provided important information on the viewing experience flavored with interactivity as they had the opportunity to compare these three ways of viewing.

These viewers were asked which way of watching the show they deemed more entertaining—being interactive or being noninteractive. Everyone answered “being interactive.” A male test participant, age 26, commented, “It is more entertaining to be active and to see how well you would have done in the quiz.” Another male participant, age 22, considered that being active as a viewer offers more stimuli and engagement, and concluded that this is good (see Figure 6).

All participants were asked what the quiz show would be like without the interactive feature enabling the viewer to play along. About half of the test participants could only speculate on how it would be, as they were interactive throughout the show. We found a significant difference in opinions in this matter (p = .01). The passive viewers thought higher of a noninteractive Enigma than did the interactive ones, especially the viewers participating via the set-top box. It appears that an interactive viewing experience with an MHP set-top box whets the viewers’ appetite, as they would not care for a passive version of the TV show.

FIGURE 6 The interactivity offers the possibility to challenge one’s self and the competing teams in the studio, according to some test participants. This viewer is only 2 points behind the studio team. © Sveng.com Production Ltd.
One of the topics discussed in the interviews was whether the viewers experienced any benefits from the participation in the narrative unfolding on the TV screen. A 25-year-old female participant argued that the interactive version is preferable because it guarantees an entertaining time in front of the television. She is forced to make decisions as to which answers are correct, and she also receives feedback on her choices. A 23-year-old man said “Without the interactivity, you would just sit there, watching without thinking.” Another woman, age 24, disagreed, stating, “Perhaps it was more entertaining to merely watch. I thought it was ok to just watch the others answering the questions too.”

In this context, the psycho-physiological results are of interest especially in the case of the group testing all three ways of watching the show. Every one of these test participants showed a higher level of skin conductance when being interactive than when passively enjoying the program. As emotions and electrochemical changes in sweat glands are related (Stern et al., 2001), we can infer that the viewers have been more aroused while playing along themselves than when watching passively.

Figure 7 illustrates the heart rate (upper curves) and skin conductance level (lower curves) of a 26-year-old woman. She watched the show passively without any interactivity during the first round, where the levels are falling. The right side of the figure shows the levels of the second round when she was playing along in the game.

6.3. Usability

Another key issue investigated in this study was usability. This refers not to the physical gadgets (i.e., the mobile phone or the remote control) but rather to the interactive applications appearing on the TV screen, and in some cases on the

FIGURE 7 The skin conductance (the lower curve) fell during the passive first round of the game show, whereas it increased during interactivity.
screen of the mobile phone. Eighty percent said that the applications were easy to understand and navigate through, especially according to the female viewers and viewers playing alone ($p = .05$). Thus, the groups of friends playing together would perhaps have been more successful in the game if they would have had more time at their disposal. The ones stating in the questionnaires that the answering time was too short (25–33 sec) were explicitly viewers watching the quiz show together with friends or family. According to 10% of the study participants, playing along in *Enigma* was “somewhat difficult.”

Although some experienced a bit of trouble in the beginning with the navigation through the applications, and with managing the remote control, the game ran fluently after some habituation to the gadget. None of the evaluators claim that the technology and the interactive applications affected the viewing experience in a negative manner. The task causing most trouble was the user information form in the beginning of the show, where it took the viewers an average of 41 sec to fill in their name and telephone number. Not a single viewer filled out the form correctly, pointing to a scarce usability of the application.

With the aid of the eye-tracking camera used in the study, the gaze and eye movement patterns of the viewers on the TV screen were recorded. This provides valuable information about what catches the viewer’s eye. The results indicate how successful the audience was in both managing its own individual game, and following the competition in the studio.

As Table 2 demonstrates, during the response time of the first question of *Enigma*, more attention was paid to the application containing the question and the four answer alternatives. More than halfway through the game, at Question 8, the participants devoted more time to following the competing teams in the studio. This indicates that the viewers had begun to find their footing, as increasingly less time was spent watching the application. Another finding is that the

| Table 2: Eye-Tracking Data for the Viewers Participating with MHP and Java Interactivity |
|------------------------------------------|------------------------------------------|
| **Java M**                               | **MHP M**                                |
| The focus of the gaze during             | The focus of the gaze during              |
| the response time of Question 1          | the response time of Question 1           |
| Application                              | Application                              |
| 93%                                      | 82%                                      |
| Studio                                   | 7%                                       |
| 18%                                      |
| The focus of the gaze during             | The focus of the gaze during              |
| the response time of Question 8          | the response time of Question 8           |
| Application                              | Application                              |
| 68%                                      | 76%                                      |
| Studio                                   | 32%                                      |
| 24%                                      |
| The focus of the gaze during             | The focus of the gaze during              |
| Rounds 1 to 3                            | Rounds 1 to 3                            |
| Application                              | Application                              |
| 30%                                      | 39%                                      |
| Studio                                   | 70%                                      |
| 61%                                      |

*Note:* The attention devoted to the interactive applications diminished during the show, allowing more time to follow the activities in the studio. The bolded figure indicates the area getting the most attention. MPH = Multimedia Home Platform.
application with the earned points in the right corner attracted more attention as the game evolved.

Figure 8 illustrates the areas of interest during all three rounds of *Enigma*. The gray color marks the area where the viewer has focused her eyes the most. Thus, the attention of this viewer, a 30-year-old woman participating with the MHP remote control, lies primarily in the center of the TV screen and naturally on the applications in the right corner and in the bottom of the screen.

Concerning the usability of the playing tools, the viewers playing with both of them considered that the mobile phone was slightly easier to operate than the remote control. When asked which gadget they would prefer when participating in an iTV show, 50% chose the phone and 50% chose the set-top box remote control. One man, age 23, commented that “a phone is a phone” and therefore he marked his preference to participate in shows using a remote control rather than employing a cross-use of the mobile phone. On the other hand, a 26-year-old woman voted for Java interactivity, her choice motivated by the ease of use: “People are so used to phones these days.”

### 6.4. Appeal

Concerning the degree of attraction of an interactive game show, the test participants were asked about their attitude toward iTV programs in the postviewing questionnaire. The fact that this question was posed after the viewing could naturally affect the outcome of the answers. Nonetheless it would be difficult for the test participants to take a position on something that they perhaps had not heard...
of or had only a vague understanding of, which would have been the case if we
would have asked them about the issue before the actual viewing of the show.

It turned out that 76% of study participants welcomed more of these programs
in the future; among the interactive participants the number was 80%, and among
the noninteractive participants the number was 56%. Only 8% of the interactive
participants and 13% of the noninteractive participants were not interested to see
more interactive programs in the future.

In the interviews, some remark that the television is by character a passive
medium and should remain as such. One man feared that some might get
addicted to the programs and spend too much time and money on them. Most of
the test participants stated, however, that they welcome more iTV programs as
long as the content does not suffer because of the interactivity. Many mentioned
that the optimal solution would be for the viewer to have the choice, whether to
enjoy the show interactively or passively. As for the content, some praised the iTV
feature, which provided feedback on questions or thoughts from experts or guests
(e.g., in the studio in lifestyle shows). Others again expressed discontent for iTV
programs with no narrative or story to be told (e.g., in the interactive games).

The majority of the test participants said that the play-along game show
Enigma was so enjoyable that they are motivated to watch it again. Many said that
it is explicitly the interactivity that attracts them. Some stated that although view-
ing was an enjoyable experience, they would not tune in again as they simply do
not like the quiz show genre.

6.5. Methods

As a minor internal part of the study, we evaluated the marriage between the
employed methods and audience research on iTV. Concerning the methods
employed, one can conclude that the eye tracking, the interviewing, the screen
recordings, and the questionnaires generated highly valuable information (e.g., about
attention, usability, and the experience of being interactive). The video surveillance of
the participants was most useful when testing the program in a group setting. The
use of video surveillance for tracking remote control and mobile phone usage was
equally fruitful, even though there were some problems with users moving their
hands intensively. A better alternative for tracking remote control usage would have
been to use the remote control tracking equipment available in the laboratory.

The recording of the participants’ psycho-physiological reactions was the least
valuable data received during the study. But by combining the results from the
questionnaires and the interviews, it is possible to shed some light on which kind
of reactions the program caused.

Another critical aspect in relation to the methods applied in this study is the
fact that it was carried out in a laboratory environment that differs from a true
home environment. One key difference is, for example, that all the equipment
used in the lab, such as mobile phones and set-top boxes, had been checked and
set up to work correctly. This might not be the case in a true home environment.
A laboratory setting is, of course, also different from a home environment where
the viewer feels more secure and at ease with the TV-watching situation.
The setup of the study with seven different groups of people representing all the different ways the show could be watched turned out to be a success. Nevertheless, it proved to be an increasingly time-consuming setup, as a lot of data had to be analyzed and compared. Still, this method provided a lot of information about the differences between individual and group use of the different interactive features in Enigma.

7. DISCUSSION AND CONCLUSIONS

As stated in the beginning of the article, the fundamental goal of the study was to find out if and how the TV program Enigma benefits from interactivity. Seen from an audience perspective, can we verify or falsify the hypothesis that the viewer experience is ameliorated when the player in front of the television is participating in the competition unfolding on the screen?

With the support of what has been presented in this article, we reached the conclusion that the integrated interactivity in the game show Enigma adds value to the viewing experience in general among young adults. The interactive feature raises the attention level and the degree of involvement and intensifies the feeling of enjoyment and excitement. Many praised the sense of challenge and action the interactivity offers. Consequently, it seems like the play-along game show Enigma does benefit from the interactivity, as it adds value to viewers participating. Peer groups playing together and younger test participants particularly found the interactive element exciting. The results show that the majority welcomes future iTV shows. Many would tune in especially because of the interactivity, although a small group feels that regardless of the enjoyable experience of interactivity, television should remain a passive medium.

Regarding these conclusions, one has to keep in mind that the results of our study are not generalizable to the vast TV audience. Such a generalization is not justified, as the empirical data of the study derived from 35 participants with an average age of 27. We can, however, draw some conclusions on young adults’ experiences of being interactive while watching televised content. Moreover, following the small number of participants, another limitation of our study is the lack of multiple viewing groups to support or dispute the results. Another issue that might have an impact on the result is that the study was carried out in a laboratory environment that differs from a true home environment. Nevertheless, the results contribute to the ongoing research toward a general understanding of enjoyment because of iTV in the eyes of the audience and what elements of the interactive viewing experience are appreciated.

Our conclusion regarding the methods is that combining a wide range guarantees a broad and a deep understanding of the interactive program studied. This can necessitate future research within the field. Another recommendation is to evaluate the whole concept, both the program and the interactivity, and not just separate the interactivity aspect.

These results of the study of the quiz show Enigma may influence future format development and TV production, as they convey what the audience desires and appreciates in an interactive game show. The results emphasize the value of
integrated interactivity and point to situations worth keeping in mind—for example, guaranteeing that the viewer playing in a peer group is granted enough time to respond to questions. Although viewers learn quickly how to navigate in the interactive applications, it must be easy to play along.

In our current research project, exEnteractivity, we plan to focus solely on the entertainment value of iTV programs and to closer investigate enjoyment and viewer experiences.

REFERENCES


