

Faculty of Behavioural, Management, and Social Sciences

Communication Science

*The role of congruence and timing in synced advertising effectiveness:  
an in-person experimental approach.*

*Master Thesis*

*Teun Sand – s2621932*

*University of Twente*

*Master Thesis Coordinator: dr. R. Jacobs*

*Second Reader: dr. E. van. Laar*

## **Abstract**

**INTRODUCTION:** Synced advertising (SA) is an advertising strategy that allows marketers to expose consumers to the same mobile and TV advertisements simultaneously. The goal of this technique is to improve advertising responses. SA can increase interest in the advertisements as consumers are more likely to see them once or twice. Prior research states that respondents perceive higher brand interest from synced advertisements than from non-synced ones.

**OBJECTIVE:** Work is needed to understand how congruence and timing affect synced advertising effectiveness, as research on this topic is limited. After all, the combination of congruence and timing creates the uniqueness of SA. Research on the combination and individual role of these dimensions on SA effectiveness helps to understand whether this advertising strategy is feasible. Therefore, the current study aimed to assess the role of congruence and timing in synced advertising effectiveness. The current study is the first to consider cognitive load as a possible influence on SA effectiveness in a framework with congruence and timing.

**METHODS:** A 2 x 2 between-subject experimental design was created to test the effect of different levels of congruence and timing on SA effectiveness. Congruence and timing were manipulated on two levels. Congruence is separated by incongruent and congruent advertising, and the timing condition includes delayed and simultaneously timed advertisements. SA is separated by SA processing and SA outcomes. SA processing is measured by recognition, comprehension, counterarguing, and an intrusiveness index. SA outcomes include purchase intention, credibility, and ad attitude. Purposive and snowball sampling was employed to recruit respondents, enabling an in-person experiment with 128 respondents within a short timeframe. Most experiments were conducted in the respondent's kitchen or living room. A mobile magazine, mobile advertisements, and a TV scenario were carefully designed to manipulate the timing and congruence of advertisements. Data was collected through a questionnaire that respondents had to answer after they had completed the experiment.

**RESULTS:** The main findings challenge prior research by highlighting new relationships between advertising processing and outcomes. The effect of congruence on cognitive load depends on timing. Consumers were likelier to purchase and recognize the advertised product in a non-SA condition. Cognitive load was high in incongruent/delayed and congruent/simultaneous advertising. Also, the current study found that comprehension and cognitive load positively predict purchase intention.

**DISCUSSION:** The combination of congruence and timing during SA results in a cognitive load leading to less positive advertising outcomes like reduced purchase intention and recognition. People have to consume two congruent advertisements simultaneously, which likely overloads their cognitive capacity and thereby troubles SA processing. Additionally, arousal from incongruent and delayed advertising is expected to affect advertising processing positively. Scientists should be careful

when adopting SA, as this research questions its effectiveness. Further exploration of SA and a deeper understanding of how cognitive load obstructs advertising processing among consumers is needed. The current study concludes that the optimization of SA is required as non-synced advertising results in purchase intention and recognition than synced advertising.

## Table of Contents

<b>1.</b>	<b>INTRODUCTION .....</b>	<b>6</b>
<b>2.</b>	<b>THEORETICAL FRAMEWORK.....</b>	<b>8</b>
2.1	SYNCED ADVERTISING .....	8
2.2	SYNCED ADVERTISING PROCESSING .....	10
2.2.1	<i>Cognitive load</i> .....	10
2.2.2	<i>Recognition</i> .....	11
2.2.3	<i>Comprehension</i> .....	12
2.2.4	<i>Counterarguing</i> .....	13
2.2.5	<i>Intrusiveness Index</i> .....	14
2.2.6	<i>Synced Advertising Outcomes</i> .....	15
2.2.7	<i>Mediator</i> .....	17
2.3	CONCEPTUAL FRAMEWORK.....	18
<b>3.</b>	<b>METHODOLOGY .....</b>	<b>19</b>
3.1	DESIGN.....	19
3.2	SAMPLING AND POPULATION.....	19
3.4	PROCEDURE.....	20
3.5	STIMULUS.....	21
3.6	MEASURES .....	22
3.7	RELIABILITY & VALIDITY .....	25
<b>4.</b>	<b>ANALYSIS AND RESULTS .....</b>	<b>30</b>
4.1	COGNITIVE LOAD.....	30
4.2	SA PROCESSING .....	31
4.2.1	<i>Recognition</i> .....	31
4.2.2	<i>Comprehension</i> .....	31

4.2.3 <i>Counterarguing</i> .....	32
4.2.4 <i>Intrusiveness</i> .....	32
4.2 THE ROLE OF CONGRUENCE AND TIMING ON SA OUTCOMES.....	32
4.3 THE TRANSITION BETWEEN SA PROCESSING AND SA OUTCOMES .....	33
4.4 COGNITIVE LOAD AS A MEDIATOR FOR CONGRUENCE.....	35
4.5 COGNITIVE LOAD AS A MEDIATOR FOR TIMING .....	36
4.6 ADDITIONAL ANALYSIS.....	37
<b>5. DISCUSSION.....</b>	<b>38</b>
5.1 COGNITIVE LOAD: A BARRIER TO SYNCED ADVERTISING EFFECTIVENESS .....	38
5.2 RELATED ADVERTISING OUTCOMES .....	39
5.2.1 <i>Counterarguing and Intrusiveness</i> .....	39
5.2.2 <i>Advertising outcomes</i> .....	40
5.3 PRACTICAL IMPLICATIONS .....	40
5.4 THEORETICAL IMPLICATIONS.....	41
5.5 LIMITATIONS AND FUTURE RESEARCH DIRECTIONS.....	42
5.6 CONCLUSION.....	44
<b>REFERENCES .....</b>	<b>45</b>
<b>APPENDIX.....</b>	<b>52</b>
APPENDIX A – FACTOR ANALYSIS INTRUSIVENESS END SCALE .....	52
APPENDIX B – QUESTIONNAIRE.....	53

## 1. Introduction

People often tell each other how scary it is that their phones are listening. "Lately, I talked with a friend about my dishwasher. A few hours later, I received a mobile advertisement regarding dishwashers." Indeed, mobile phones are listening, and researchers have already described these phenomena (Segijn, 2019; Segijn & Van Ooijen, 2020; ZIGT, 2015). One of these phenomena is commercial watermarking, a technique companies use to determine which advertisements consumers watch. The technique applies a sound-detecting method to identify which advertisement the consumer is watching (ZIGT, 2015). Afterward, external parties use information about consumers' current watching behavior to buy ad space (ZIGT, 2015). This ad space is used to expose the consumer to a mobile advertisement that simultaneously advertises the same brand as the TV advertisement.

Combining multiple media has also become more popular among consumers. Many people stream content while checking news articles, writing posts on social media, or chatting with friends on their mobile phones. Combining different media for advertising can be efficient because of the complementing effects of media characteristics (Segijn, 2019). Combining different media for advertising can make it easier for consumers to process the advertisement and, ideally, increase brand interest. Segijn (2019) was the first to conceptualize this advertising strategy into a concept called synced advertising (SA). The introduction of SA comes with two essential dimensions: congruence and timing. Congruence and timing are crucial for SA since the mobile advertisement that is present simultaneously must be congruent with the TV advertisement (Segijn, 2019). Congruent advertisements promote the same brand; the media characteristics and content of the advertisements overlap. Timing refers to the timing of the mobile advertisement, which is simultaneously or shortly after the TV advertisement is presented (Segijn & Voorveld, 2021). Prior research on the role of timing shows that attention to the ads is highest when the mobile ad is presented simultaneously with the TV advertisement (Segijn & Voorveld, 2021). Furthermore, congruence can make it easier for consumers to process and retrieve information as advertisements from multiple sources overlap (Kouider & Dehaene, 2007). Additionally, consumers find ads from multiple sources more believable (Chang & Thorson, 2004; Gao & Zhao, 2021; Lim et al., 2015; Voorveld, 2011). In all, some research has contributed to the individual role of congruence and timing in an SA or multi-screening context. However, the collective role congruence and timing on SA effectiveness have not been researched.

The lack of research on the role of congruence and timing in SA creates a research opportunity. Therefore, this research aims to determine to what extent SA effectiveness is affected by congruence and timing. Within the current study, SA effectiveness includes purchase intention, ad attitude, and ad credibility. Based on prior research, it is expected that the congruence and timing of advertisements have an influence on whether consumers want to buy the advertised product, like the advertised product, or find the advertisement credible (Gao & Zhao, 2021; Huang & Yoon, 2021; Janssens et al., 2012; Lim

et al., 2015; Segijn, 2019). Another novelty of the current research comes from considering cognitive load as a potential influence on SA effectiveness. Segijn (2019) identified capacity interference as a possible threat to SA but did not research this. Prior research on media multitasking showed that consumers were less in favor of advertisements when different media were combined (Bolls & Muehling, 2007). This can be explained by a higher cognitive workload among customers through media multitasking, resulting in decreased advertising effectiveness (Jeong & Hwang, 2012). Altogether, SA comes with opportunities but also possible threats. The current study will measure to what extent SA increases the cognitive load of respondents to assess how the mental workload affects consumers' SA perception.

As indicated earlier, the current study measures how respondents perceive SA. This is described as “information processing” of SA within this paper. Recognition, comprehension, counterarguing, and intrusiveness are studied to understand information processing within SA. Prior research shows that media multitasking decreases the extent to which consumers understand the advertised message and remember what they have read (Armstrong & Chung, 2020; Zhang et al., 2010). Furthermore, multi-screening can reduce consumers' counterarguments against the advertisement (Jeong & Hwang, 2012; Segijn & Voorveld, 2021). Additionally, people likely feel intruded on by SA as they are not well informed about its practices (Segijn & Van Ooijen, 2020). Intrusiveness results in negative feelings like ad irritation, which could result in ad avoidance and reactance against SA (Brinson & Britt, 2021; Youn & Kim, 2019). Understanding how these variables behave in an SA context is important to determine whether synced advertising is effective. Additionally, even though the effect of congruence and timing in advertising has been studied before (Gevorgyan & Manucharova, 2015; Segijn et al., 2017; Yoo, 2009), it remains unknown how these elements affect SA effectiveness on such a comprehensive level. Therefore, the main question of the current study is:

*How do the timing and congruence of mobile and TV advertisements influence synced advertising effectiveness?*

## 2. Theoretical framework

This section provides a fundamental understanding of the core concepts of this research. The first part explains SA and how congruence and timing are fundamental for this technique. An introduction to media multitasking explains essential variables researched before and describes how SA effectiveness is likely to be affected by this. Additionally, an overview of the cognitive processes in information processing is presented. These processes are essential for understanding how consumers make sense of advertisements and how cognitive load affects recognition, comprehension, and counterarguing. Lastly, SA is expected to trigger intrusiveness, and it is explained how intrusiveness produces negative emotions. A conceptual framework is presented to facilitate a theoretical understanding of the relationships of variables, and it visually supports hypotheses.

### 2.1 Synced advertising

Consumers are not limited to one screen anymore. People increasingly use more than one medium concurrently, and this media multitasking behavior creates opportunities (Rideout et al., 2005). Synced advertising (SA) is an emerging technology in this environment. Within SA, a mobile advertisement is synchronized with another advertisement via a different device (television). The consumer is exposed to two similar advertisements simultaneously. This emerging technology uses the current media behaviour of consumers to match the content and timing of the mobile advertisement with the TV advertisement. For example, someone is watching television, and the ad banner on the individual's phone is congruent with the TV advertisement that runs parallel (Segijn, 2019). Hence, one advertisement is displayed two times, simultaneously, on two different devices.

To make synced advertising more understandable, a distinction between congruence and timing is most relevant in terms of a practical and theoretical point-of-view. The interplay between timing and congruence takes place between a mobile phone and a television. Figure 1 visualizes the practical operationalization of SA. The timeline shows how the mobile device detects the TV advertisement, and a congruent advertisement will be presented on the mobile device. Congruent advertisements promote the same product and brand. Secondly, timing is another dimension of synced advertising. Findings on the role of ad sequence in SA outcomes were generated by Segijn et al. (2021). The advertisements received the most attention when the mobile and TV advertisements were presented simultaneously (Segijn et al., 2021). Within the current research, SA is advertising wherein the mobile and TV advertisements are congruent and presented simultaneously. A more extensive elaboration on timing and congruence from prior research will be discussed later in this section.

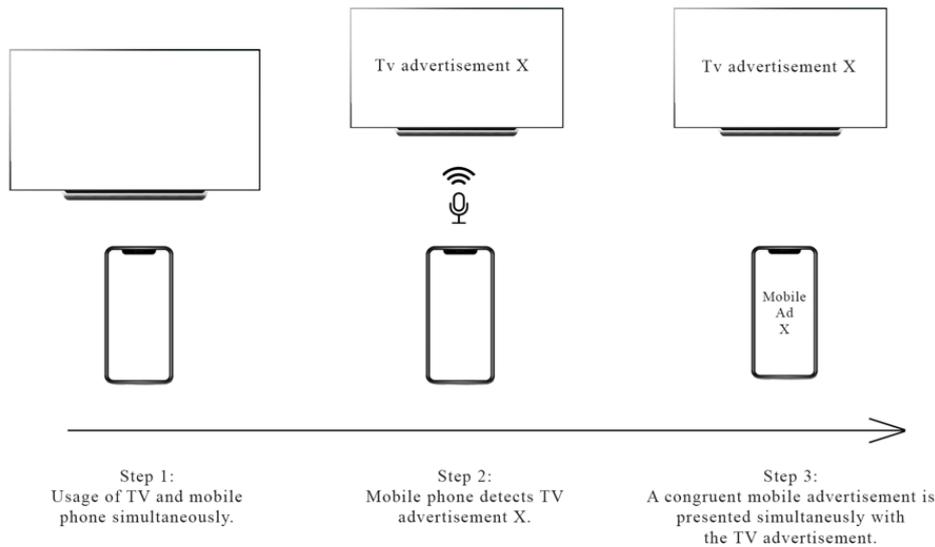


Figure 1. Timeline synced advertising

Different techniques are used to realize the practical implementation of SA, which are discussed below. However, commercial watermarking is the SA technique implemented in the current study. This technology uses a mobile microphone to detect audio from a TV advertisement that is being watched (ZIGT, 2015). Users often unknowingly allow organizations to acquire data by accepting the terms and conditions of mobile applications. After the TV advertisement is identified, the same advertisement is presented on a mobile device (e.g., mobile phone or t). Other SA techniques are hashtag tracking or advanced segmentation techniques (Segijn, 2019). These techniques are not considered feasible for this research. Hashtag tracking adapts Twitter to target customers, and it is expected that not everyone in the target population will use Twitter. Advanced segmentation techniques rely on geographical or demographic information, and it is beyond the time and capacity scope of the current research to collect this data. Instead, everyone in the target population is expected to be familiar with a mobile phone and television; hence, commercial watermarking is the most feasible technique to simulate SA.

Lastly, SA should not be confused with online behavioural advertising. SA differs from OBA since SA relies on current instead of past behavior (Segijn, 2019). SA is "the practice of monitoring people's current media behavior and using the collected information to show people individually targeted ads based on people's current media behavior across media" (Segijn 2019, p. 59). OBA creates a personalized ad that relies on data concerning the customer's past online behavior (Acquisiti et al., 2013). All in all, consumers have a higher knowledge perception of OBA than SA (Segijn & Van Ooijen, 2020). It is expected that consumers are less aware of SA than OBA. Synced advertising is relatively new, and consumers might be less familiar with it in terms of knowledge and experience.

## 2.2 Synced Advertising Processing

### 2.2.1 Cognitive load

Synced advertising creates an environment wherein individuals are exposed to various types of information from different sources, thereby demanding cognitive load. The cognitive theory of multimedia learning by Mayer and Moreno (2003) explains that text and graphics are processed better in the working memory than text alone, a combination of synced advertising allows. Mayer and MorenoTheseThe processed words and images are then integrated with prior knowledge to make sense of the information. The multi-media learning theory aligns with the dual-coding theory (Paivio, 1986) and the theory of working memory (Baddeley, 1998). These theories describe that human information processing consists of two separate channels: words are processed through a verbal channel, whereas pictures are processed by the visual/pictorial channel (Mayer & Moreno, 2003). However, how well tasks are performed depends on the available capacity and the workload of each task (Kahnemann, 1973). Kahnemann explains the idea that human beings have a limited amount of cognitive capacity available. The model explains that information exposed from different sources concurrently can constrain information processing and cause interference. Subsequently, the cognitive performance demanded by a task exceeds the available cognitive capacity, resulting in a cognitive overload (Kahneman, 1973). Additionally, other cognitive learning theories explain that processing information from multiple sources simultaneously limits information processing and can affect cognitive performance (Lang, 2002; Salvucci & Taatgen, 2010). Overall, information processing happens through various brain channels with a limited capacity. The current research is most interesting in the possible interference of information processing influenced by cognitive overload.

As explored below, prior research shows how consumers' information processing can be interfered with by using multiple screens. Even though prior research contributed to media multitasking, similar activities are expected to occur during SA. First, Jeong and Hwang (2016) conclude that media multitasking negatively affects brand interests like recognition. Secondly, background TV disturbs recall and comprehension when reading newspaper articles (Armstrong & Chung, 2020). Performing similar tasks simultaneously generates less favorable ad responses (Bolls & Muehling, 2007). Furthermore, reading newspapers while watching television decreases recognition (Zhang et al., 2010). Different combinations of media multitasking affect various advertising outcomes. Bolls and Muehling (2007) combined a visual offline task (viewing pictures) with a radio advertisement. Additionally, Segijn (2019) highlighted capacity interference as a possible barrier for SA since individuals use multiple devices simultaneously while being exposed to different messages. Thus, modern advertising techniques are still threatened by an increased cognitive load. Consumers appear to perform advertisements less effectively when exposed to multiple screens simultaneously.

All in all, prior research shows that media multitasking can increase cognitive load. Cognitive theories explain how information like images and words is processed through different channels.

Congruent advertisements present images and words simultaneously, which is likely to increase the mental workload. However, to the knowledge of the current study, the literature presented above did not incorporate congruence. Since little is known about the extent of influence of congruency on cognitive load, the following research question is proposed:

*RQ 1: To what extent does congruent advertising influence cognitive load compared to incongruent advertising?*

Findings on timing give more insights into the effect of timing on cognitive load during media multitasking. For example, Bolls and Muehling (2007) show how performing similar tasks simultaneously generates less favorable ad responses. Furthermore, media multitasking refers to doing tasks simultaneously, so exposure to factors affecting cognitive load is simultaneous. It is expected that simultaneous timing results in a higher cognitive load; therefore, the following is hypothesized:

*H1: Simultaneous advertising increases cognitive load compared to delayed advertising.*

### **2.2.2 Recognition**

Recognition refers to identifying something someone has seen before, and recognition is used as a measure for advertising. Recognition is the most sensitive measure of memory and explains whether the information is encoded (Lang, 2000). Objects and information that are easier to recognize are more liked than those that are difficult to recognize (Alter & Oppenheimer, 2009). Lang (2000) explains that the ease of recognition depends on how well a message is encoded. The Limited Capacity Model explains how information is processed based on three core processes: encoding, storage, and retrieval (Lang, 2000). Successful encoding, storage, and retrieval make it easier for someone to recognize this information. Media multitasking is expected to interfere with these three core processes and reduce recognition. More recent research shows how media multitasking affects recognition. Segijn et al. (2017) showed that multi-screening decreases recognition. However, recognition had a positive outcome on how consumers perceived the advertisement. Recognition increased purchase intention, brand attitude, and ad attitude. Lang (2002) states that recognition decreases through short cognitive overload experienced by the orienting response when cognitive load is high. This means that cognitive overload makes people less likely to remember information. Additionally, research proves that media multitasking increases cognitive load and decreases recognition (Jeong & Hwang, 2016; Van Cauwenberge et al., 2014). On the other hand, Gao & Zhao (2021) tested synergistic and non-synergistic advertisements and proved that recognition was higher amongst the synergistic condition. The synergistic condition included two different sources presenting the same information (broadcast media and interactive media). The different characteristics of the medium increased recognition. This finding

shows that congruent messages presented by different sources increase recognition. After all, the prior research presented above shows that recognition behaves differently in terms of congruence and timing.

Timing and congruence are expected to affect congruence differently. The role of timing in recognition is evident. Media multitasking depends on timing, as consumers use different mediums simultaneously. Multiple sources indicate that recognition decreases when consumers are exposed to different mediums simultaneously (Jeong & Hwang, 2016; Segijn et al., 2017; Van Cauwenberge et al., 2014). Regarding congruence, the current research expects that congruence increases recognition. Gao and Zhao (2021) showed that presenting information about the same brand on different devices increases recognition. Considering these findings, the following hypotheses are proposed:

*H2: Congruent advertising increases recognition compared to incongruent advertising.*

*H3: Simultaneous advertising decreases recognition compared to delayed advertising.*

### **2.2.3 Comprehension**

The amount of information that has to be processed simultaneously increases as consumers use multiple devices simultaneously. Comprehension is another indicator of advertising processing and helps the current study to understand to what extent consumers understood the target advertisement's message. Comprehension is crucial for persuasion and defines one's ability to understand a message (Jeong & Hwang, 2015). People who only read the persuasive arguments comprehended information better than those who read the persuasive arguments while exposed to visual advertisements (Jeong & Hwang, 2012). Liu and Gu (2019) focused on information processing of congruous and fragmented information and explained how media multitasking can affect comprehension. Reading performance was higher when information processing was continuous, meaning people understand information better when they read the content in one go (Liu & Gu, 2019). With synced advertising, reading is fragmented. Two advertisements are distributed simultaneously, which can distract the customer and disrupt reading. After all, consumers must understand an advertisement message to be persuaded, which seems to be negatively affected by media multitasking.

To conclude, prior studies on comprehension showed that comprehension decreases when consumers are exposed to multiple sources simultaneously. It is found that an increased cognitive load or distraction can reduce comprehension (Jeong & Hwang, 2012; Liu & Gu, 2019). The timing of the stimuli in the literature presented above was simultaneous, as consumers were using multiple devices simultaneously. Based on these findings, it is expected that comprehension is lower when the respondents are exposed to two advertisements at the same time. Therefore, the following is assumed:

*H4: Simultaneous advertising decreases comprehension compared to delayed advertising.*

Literature on the influence of advertising congruence on comprehension is less evident. Findings could suggest that congruent advertising decreases comprehension, as consumers' reading behavior is likely disrupted (Liu & Gu, 2019). On the other hand, congruent advertising could also be easier to understand. Congruent ads overlap and might be considered one advertisement by the consumer; hence, they are regarded as continuous reading. Considering the various assumptions that congruence can affect comprehension in both ways and little prior research on this topic is found, the following research question is proposed:

*RQ2: To what extent does congruent advertising influence comprehension compared to incongruent advertising?*

All the information presented above suggests that congruence and timing predict comprehension. It remains unknown whether timing influences congruence or congruence influences timing. In order to fill this research gap, the following question is proposed:

*RQ3: Is there an interaction between timing and congruence on comprehension?*

#### **2.2.4 Counterarguing**

Consumers counterargue whenever facing persuasive advertisement messages. People ask themselves whether they agree with the statement or not. Media multitasking increases persuasion by reducing counterarguing (Baron et al., 1973; Jeong & Hwang, 2012). Counterarguing is "the generation of thoughts that dispute or are inconsistent with the persuasive argument" (Slater & Rouner, 2002, p. 180). When an individual is aware of the persuasive message and re-affirms its argument, he or she is unlikely to identify with the message and show resistance against the message. Petty et al. (1976) found that people counterargue less when distracted. Jeong and Hwang (2012) tested this phenomenon in a modern multiscreen context. Multi-screening resulted in fewer counterarguments and decreased resistance compared with single screening. Moreover, Segijn et al. (2016) state that a multiscreen environment resulted in fewer counterarguments and a more positive attitude toward TV advertisements and purchase intentions. Literature shows the effect of distraction on counterarguing. People counterargue less when they are distracted.

SA can create distraction since consumers simultaneously see two advertisements with the same content. Multi screening has been proven to reduce counterarguments before (Baron et al., 1973; Jeong & Hwang, 2012). As stated earlier, SA is expected to behave similarly to multi screening. Therefore, simultaneous timing is expected to decrease counterarguing since consumers are distracted. Additionally, the presence of congruent advertisements is expected to distract the consumers. People will likely notice that the two advertisements belong together, which could be distracting. Based on this, the following hypothesis is proposed:

*H5: Congruent advertising decreases counterarguing compared to incongruent advertising.*

*H6: Simultaneous advertising decreases counterarguing more compared to delayed advertising.*

### **2.2.5 Intrusiveness Index**

Intrusiveness is a feeling of unease when consumers feel that they are being monitored. Intrusiveness is a negative response caused by how advertisements are executed. Intrusiveness comes from the psychological reactance theory (PRT) and explains how negative feelings are evoked through persuasive messages that threaten freedom or control (Brehm & Brehm, 1981). Intrusiveness can occur when individuals experience SA practices (Segijn, 2019). Awareness of this advertising technique creates suspicion and reactance (Segijn, 2019). Within the current research, intrusiveness also includes threat to freedom, ad irritation, and reactance. Together, these four measurements are expected to give a representative understanding of the negative feelings that SA can trigger.

Consumers produce negative feelings from advertising in various ways. First, intrusiveness triggers anger and is perceived as a threat to consumer freedom (Youn & Kim, 2019). The Psychological Reactance Theory identifies autonomy as a fulfilling need for human beings (Brehm & Brehm, 1981). Consumers show psychological reactance once their autonomy is taken away. They resist what the advertisement wants to accomplish, for example, persuasion (Quick & Stephenson, 2008). SA decreases consumer freedom by interrupting behavior through pop-up advertisements that include persuasive messages. Interrupted behaviour of consumers triggers irritation and interferes with ad processing (Li et al., 2002). This finding overlaps with a previously discussed decrease in comprehension and regression by negative feelings. Within SA, it is expected that ad irritation is mainly produced by its execution, exposing consumers to two congruent advertisements simultaneously. Segijn and Van Ooijen (2020) showed that people were unaware of SA. This could suggest that consumers struggle to identify SA once they experience it.

It can be seen that personalized ads, ad irritation, and intrusiveness can cause negative emotional responses among consumers. Ultimately, consumers' ad irritation and intrusiveness increase ad avoidance and reactance towards online advertisements (Brinson & Britt, 2021; Youn & Kim, 2019). The intrusiveness index includes intrusiveness, ad irritation, reactance, and threat to freedom. Timing is expected to predict the intrusiveness index since advertisements that are timed during consumers' viewing behavior are perceived as intrusive. Additionally, the effect of congruence on intrusiveness remains unknown. Congruence can increase relevance, and irrelevant advertisements are perceived as irritating, suggesting that relevant advertisements are less irritating. On the other hand, congruence can make SA more noticeable. Consumers might notice that the advertisements are congruent and become

aware of SA practices, increasing intrusiveness. Considering these findings, the following is hypothesized:

*RQ4: To what extent does congruent advertising influence intrusiveness compared to incongruent advertising?*

*H7: Simultaneous advertising increases intrusiveness compared to delayed advertising.*

An interaction effect between timing and congruence on intrusiveness is expected. Presenting congruent and simultaneous advertisements to consumers is likely to increase intrusiveness. Therefore, the following hypothesis is proposed:

*H8: Consumers feel most intruded on when congruent advertisements are presented simultaneously.*

Lastly, intrusiveness is expected to overlap with counterarguing since intrusiveness makes people more aware of the advertisement. Intrusiveness evokes adverse emotional outcomes such as irritation and a perceived threat to freedom (Li et al., 2002; Youn & Kim, 2019). These emotions can motivate people to counterargue. Considering this, the following effect is expected:

*H9: Intrusiveness increases counterarguing.*

### **2.2.6 Synced Advertising Outcomes**

The following section describes the three variables used to measure SA effectiveness. SA effectiveness is described by purchase intention, ad credibility, and mobile ad attitude. Purchase intention indicates whether participants would buy the product and helps to describe SA effectiveness (Segijn et al., 2016). Dijkstra et al. (2005) found that combining TV and print media improves purchase intention. Also, Within the current study, ad credibility refers to "the extent to which the consumer perceives the message in the ad to be believable" (MacKenzie & Lutz, 1989, p. 51). It is assumable that SA increases ad credibility, as exposing a customer to one advertisement on multiple sources can increase ad and brand credibility (Chang & Thorson, 2004; Lim et al., 2015; Voorveld, 2011). Furthermore, mobile ad attitude is the third evaluative outcome of SA effectiveness. In this research, mobile ad attitude refers to consumers liking mobile advertisements. Research proved that ad congruence generates positive attitudes towards online banner ads (Huang & Yoon, 2021; Janssens et al., 2012). Regarding credibility, ad repetition in a multiple-media environment resulted in higher ad credibility than in a single-media environment (Lim et al., 2015). The findings suggest that overlapping characteristics of different advertisements positively affect SA outcomes.

All in all, findings on the potential role of congruence and timing on SA outcomes are promising. Research on media multitasking and congruence show its positive influence on purchase intention (Chang & Thorson, 2004; Dijkstra et al., 2005; Lim et al., 2015; Segijn et al., 2016; Voorveld, 2011). SA includes purchase intention, ad credibility, and mobile ad attitude within the current study. The effect of congruence and timing on these three variables is expected to be the same. Considering prior research on media multitasking that is expected to apply to SA, the following relationships are proposed:

*H10: Congruent advertising increases purchase intention compared to incongruent advertising.*

*H11: Simultaneous advertising increases purchase intention compared to delayed advertising.*

*H12: Congruent advertising increases ad credibility compared to incongruent advertising.*

*H13: Simultaneous advertising increases ad ad crediblity compared to delayed advertising.*

*H14: Congruent advertising increases mobile ad attitude compared to incongruent advertising.*

*H15: Simultaneous advertising increases mobile ad attitude compared to delayed advertising.*

Consumers first process information before determining whether to purchase the advertised product, find the ad credible, or favor the online advertisement. Recognition, comprehension, counterarguing, and intrusiveness are the four variables that describe SA processing. SA processing is expected to influence the SA outcomes. Segijn et al. (2016) found that multi-screening decreased the number of counterarguments, resulting in higher purchase intention. However, SA is expected to increase intrusiveness. High intrusiveness increases the number of counterarguments. Counterarguing produces psychological reactance, increasing awareness about the persuasive message and decreasing purchase intention (Quick & Stephenson, 2008). Also, intrusiveness is expected to decrease purchase intention by bringing out psychological reactance, ad irritation, and a threat to freedom (Brinson & Britt, 2021; Youn & Kim, 2019). Furthermore, as purchase intention depends on basic rational information, advertisement comprehension is assumed to be related to the purchase intent. Ideally, advertisements inform and persuade consumers and thereby increase purchase intention. Gao and Zhao (2021) proved that combining online broadcast media with interactive media increases purchase intention through different information processing levels. An increase in product recognizability and awareness creates this gain. Additionally, recognition increases purchase intention in a multiscreen scenario (Segijn et al., 2017). Regarding ad credibility, recognition is believed to increase ad credibility as highly recognizable brands are more liked (Alter & Oppenheimer, 2009). Thus, prior research showed how intrusiveness and counterarguing from multi-screening trigger reactance and decrease purchase intention, possibly ad credibility and mobile ad attitude. Additionally, comprehension and recognition generate positive evaluative outcomes from advertisements.

SA processing appears to positively influence SA outcomes when considering prior research on media multitasking. Evidence of the influence of SA processing on purchase intention is substantial (Brinson & Britt, 2021; Gao & Zhao, 2021; Quick & Stephenson, 2008; Youn & Kim, 2019). Ad credibility and mobile ad attitude are expected to behave similarly to purchase intention within the current study. Therefore, recognition and comprehension are expected to increase ad credibility and mobile ad attitude. Intrusiveness and counterarguing are likely to decrease ad credibility and mobile ad attitude. Based on the findings and reasoning presented above, the following influence of SA processing on SA outcomes is expected:

*H16: Purchase intention is predicted positively by (a) comprehension and (b) recognition and negatively by (c) counterarguing and (d) intrusiveness.*

*H17: Ad credibility is predicted positively by (a) comprehension and (b) recognition and negatively by (c) counterarguing and (d) intrusiveness.*

*H18: Mobile ad attitude is predicted positively by (a) comprehension and (b) recognition and negatively by (c) counterarguing and (d) intrusiveness.*

### **2.2.7 Mediator**

As explained below, cognitive load is expected to mediate SA processing. Lang (2000) states that a high cognitive load interferes with information processing. The Limited Capacity Model explains that people have limited cognitive capacities and that information processing decreases when the available cognitive capacity is exceeded. As discussed earlier in the section on cognitive processing, overloading information channels decreases information processing (Baddeley, 1998; Kahnemann, 1973; Mayer & Moreno, 2003; Paivio, 1986). Media multitasking increases cognitive load and is expected to affect SA processing. Counterarguing is expected to be affected as a cognitive load can decrease recall, which is needed for counterarguing. A similar effect is expected between cognitive load and intrusiveness. The negative influence of a cognitive load on counterarguing and intrusiveness aligns with the role of cognitive load toward recognition, whereby it affects the encoding process (Jeong & Hwang, 2016; Van Cauwenberge et al., 2014). Additionally, an increased cognitive load reduces comprehension (Jeong & Hwang, 2012; Liu & Gu, 2019). These findings suggest that cognitive load mediates the relationship between congruence, timing, and SA processing. In order to test this, the following hypotheses are proposed:

*H19: Cognitive load mediates the relationship between advertising congruence and (a) comprehension, (b) recognition, and (c) counterarguing.*

H20: Cognitive load mediates the relationship between advertising timing and (a) comprehension, (b) recognition, and (c) counterarguing.

### 2.3 Conceptual Framework

Figure 2 gives an overview of all variables and the expected relationships. The framework works from left to right and starts with congruence and timing, the two dimensions of SA. Cognitive load is expected to affect the relationship between congruence and timing. However, a direct effect of congruence and timing on recognition, comprehension, and counterarguing is expected. The framework presents the intrusiveness index on a different row since it includes multiple variables and is therefore considered differently. The index includes intrusiveness, ad reactance, ad irritation, a threat to freedom, and psychological reactance. Recognition/comprehension/counterarguing are expected to be essential for the information processing of SA. The outcomes that define SA effectiveness are presented on the right-hand side. Purchase intention is the most important outcome of SA. Ad credibility and attitude support the PI findings and help explain this relationship.

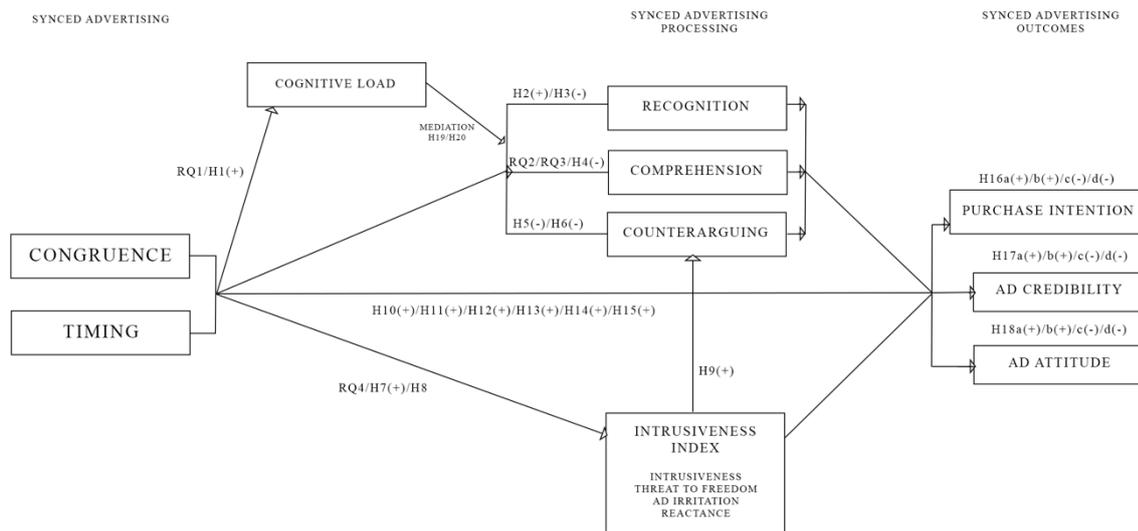


Figure 2. Conceptual framework

### 3. Methodology

#### 3.1 Design

This research is designed as a 2 x 2 between-subject experiment. This means that there are two levels of the manipulated variables. Within this study, congruence and timing are manipulated. Figure 3 shows the different conditions and the sample distribution of the conditions. Respondents watched television while using a mobile phone simultaneously in all conditions. All the respondents saw the same TV advertisements. Differences between the conditions came from the operationalization of mobile advertisement. The first condition included a TV and mobile advertisement that were congruent and timed simultaneously, and this condition represents SA. The second condition is partly SA, as the current study considers SA as congruent and timed simultaneously. The advertisements in the second condition were also congruent but delayed. The last two conditions were incongruent. Namely, the third condition was incongruent and timed simultaneously. The fourth condition presented incongruent advertisements, and the mobile advertisement was delayed.

<i>2 x 2 between-subject design with sample size</i>			
		<i>Timing</i>	
		<i>Simultaneously</i>	<i>Delayed</i>
<i>Congruence</i>	<i>Congruent</i>	n = 38	n = 30
	<i>Incongruent</i>	n = 30	n = 30
<i>Total</i>		N = 128	

Figure 3. Conditions and sample size

#### 3.2 Sampling and Population

The current study was tested among N = 128 respondents. Figure 3, presented above, shows the distribution throughout the four conditions. The congruent and simultaneously delayed condition is slightly bigger due to inconveniences in the distribution of the experiment. The sampling approach aimed at finding at least 120 participants in a relatively short period. Experiments require at least 30 respondents in total, according to Cohen et al. (2007). The control group and experimental group should both include 15 people. However, the current study implemented a minimum of 30 respondents per condition to give a representative sample and enhance statistical power. The only requirement was a minimal age of 18. The age of respondents ranged between 18 and 67 years old. The sample included 53 female and 74 male respondents; one person preferred not to tell their gender.

Respondents were recruited using convenience sampling and snowball sampling. First, convenience sampling was carried out by asking friends and family. The majority of the sample lived

in the same area and were Dutch (87 %). The other 13% was represented by Germans (n = 16) and one Portuguese. The first sample was used as a starting point; from there, people started to refer colleagues, family, and friends for participation, and snowball sampling facilitated new respondents. Additionally, respondents were also targeted by going from door to door. The most significant part of the experiments was conducted in person. This means the experiment was conducted in the respondents' homes, mainly in kitchens and living rooms. Additionally, 15 experiments took place online. Respondents were not familiar with the advertised brand. Only three respondents knew Waiākea, and 125 were unaware of the brand.

### **3.3 Pre-test**

Five pre-tests were conducted to optimize the experimental procedure and test the readability and understandability of the questionnaire. Some bugs were found in the operationalization of the experiment, as the pop-up advertisements did not always function on Android devices. Therefore, all the experiments were conducted using the researcher's laptop as a TV and the researcher's mobile device for the respondents to read articles. Respondents used their mobile phones to answer the questionnaire. A few changes were made in the formulation of research questions. An additional explanation of the definition of the items of the NASA-TLX was provided in the final questionnaire. No comments were made about the TV show, advertisements, or magazine articles.

In terms of functionality, the pre-test showed that the respondents should scan the QR code that gave mobile directions to the magazine environment while the researcher started the video. The mobile pop-up was timed at a particular moment, depending on whether the condition was timed simultaneously or delayed. The timer for the pop-up advertisement started to count down after the respondent entered the mobile magazine environment. Proper testing and accurate timing were crucial to ensure that the respondents received the mobile pop-up at the exact moment. All the experiments were appropriately timed, and the pop-up advertisements were shown at the right moment.

### **3.4 Procedure**

The following section explains where and how the respondents participated in the experiment. Most of the respondents were tested in their home situation, at their kitchen. This allowed for a realistic environment wherein the respondents were likely to behave naturally. All the respondents had to read and sign the informed consent before participating. However, informing participants about the advertisement of interest and the aim of the study causes biases and unrealistic manipulations. With this in mind, the informed consent explained that the experiment covers a media behavior analysis. A detailed explanation of what really was going to happen and be tested was left out. After signing the informed consent, the respondents were informed that they would watch a TV block followed by some advertisements. They were asked to read at least one article while watching television so that media

multitasking was ensured. Respondents could ask questions during the briefing in case something was not clear. The experimental procedure started after the respondents were fully informed.

The procedure first explains the TV advertisements and ends with the mobile advertisements. A detailed description of the mobile advertisement is presented in the section afterward. The current study decided not to start with the advertisements immediately. The TV block gives the respondent time to get used to the experimental setting, making the transition to the advertisements more realistic. Ideally, respondents first watch the TV block and start reading while the advertisement block starts. Similar scenarios are expected to happen in real life; people watch TV, and whenever the advertisements start, they take their phones and media multitasking. Having considered this, all the conditions entailed a two-minute sequence of MasterChef's TV series, followed by a three-minute advertisement block. The first advertisement was a filler ad. The second advertisement was the target advertisement. The mobile advertisement was presented as a pop-up ad. The mobile ad was presented during the target TV advertisement in the simultaneously timed condition and shortly after the target TV advertisement in the delayed condition. The last two advertisements were also filler ads. The filler ads' content is not tested but used to create a larger advertisement series. Only implementing the target advertisement could make it evident that this is the advertisement of interest. According to Richter (2010), posing a manipulation check before testing the dependent variables affects the relationship between variables. It could have happened that respondents noticed the importance of the target advertisement. This could make respondents more aware of the advertisement and generate unwanted findings.

The mobile environment is a manipulated online magazine environment; Segijn et al. (2021) have implemented this approach. The current study has ordered a third-party person to program this environment, which is beyond the researcher's knowledge. The environment allowed for manipulating the mobile advertisement in a magazine environment. The magazine included articles of various interests: sports, culture, economy, and entertainment. No articles with political statements or sensitive information were used as this could generate negative emotions, subsequently, this can affect the mood of the respondent. The goal was to create and conduct a realistic and fun experiment. A similar approach was adopted in the selection of the target TV advertisements. Three ads have been selected with a somewhat different context, including food, household products, and kitchen furniture. The first two filler ads only included images and music. The third filler ad entailed spoken words throughout the ad, which matched the target ad. The target ad was expected to stand out too much if it was the only one with persuasive arguments. The carefully selected ads provide a balanced audio-visual load.

### **3.5 Stimulus**

This experiment used one target TV advertisement (video) and one mobile advertisement (picture) to create SA. The congruent mobile ad promoted the same brand as the target TV advertisements. Both ads presented Waiākea, a sustainable brand that sells volcanic water (Waiākea, 2022). The incongruent

mobile ad was different from the TV advertisements. The incongruent mobile ad included the brand alter eco, a certified Fair Trade company selling chocolate (Alter Eco Foods, 2022). The brands were expected to be unknown to the respondents since they are mainly active in the American market. Careful brand selection helps to avoid confounding effects caused by brand familiarity or previous exposure (Geuens & De Pelsmacker, 2017). For example, brand familiarity could have affected purchase intention. Additionally, it was supposed that the attitude towards these consumable goods was relatively neutral since they are gender-neutral and do not address political or socially sensitive matters. Sensitive topics could cause negative emotions among respondents. Emotions like irritation or reactance could have affected experimental outcomes.



Figure 4. Congruent and incongruent mobile advertisements

Figure 4 presents the congruent and incongruent mobile advertisements. The current study aimed at creating a visual style that was not too distracting yet appealing. The goal is to draw attention to mobile advertisements, but consumers should not be overloaded with different colors and designs. This might increase the cognitive load. Therefore, the visual design of the advertisement is based on the colors of Waiākea and Alter Eco. Also, the same style is used for mobile ads to keep the potential influence of colors and visual design on respondents the same.

### 3.6 Measures

This research aims to determine the potential influence of congruence and timing on SA effectiveness. As discussed earlier, the current study divides SA into SA processing and SA outcomes. It is expected that consumers first process SA, followed by determining their evaluative outcomes, as earlier presented in the conceptual framework (figure 2). Besides cognitive load, cued recall, and recognition, all items were measured on a 7-point Likert scale. A complete representation of the measurements and answering options is presented in the questionnaire found in Appendix B. The variables are measured in a different

order wherein the measurements are least likely to affect each other. The measurements are presented below in the order used within the questionnaire.

Cognitive load is measured first as the respondents are expected to have a clear memory of the experiment and are unaffected by other measurements. The NASA-TLX measures cognitive load, and respondents are asked to determine the mental workload of the experiment on a 21-point scale. The NASA-TLX was created by Hart and Staveland (1998). The NASA-TLX was used to measure mental workload based on the six subjective subscales: *mental demand (MD)*, *physical demand (PD)*, *temporal demand (TD)*, *own performance (OP)*, *effort (EF)*, and *frustration level (FR)*. MD measures the mental and perceptual activity needed, e.g., thinking, searching, and looking. PD includes the physical activity involved in the task, like pressing a button or swiping. TD refers to measuring the time pressure respondents perceived while executing the task. Determining how successful respondents found themselves belongs to OP. The mental and physical effort of performance achievement is measured through EF. Lastly, FR measures the balance of feelings and indicates how insecure, discouraged, irritated, stressed, and annoyed respondents felt towards the task versus secure, gratified, content, relaxed, and complacent. However, FR was left out as it measures feelings that overlap with intrusiveness.

Purchase intention is measured through four items that identify to what extent respondents are likely to buy the advertised product. Alalwan (2018) applied this approach before. Respondents were asked whether they would buy the online advertised product. The items included questions like “I will buy the product that was advertised in the Waiākea TV advertisement.” Purchase intention was asked at the beginning of the questionnaire as well. It was expected that questions regarding intrusiveness and counterarguing could negatively affect to what extent respondents would buy the advertised product.

Recognition was measured after purchase intention and includes recognition memory and cued recall. Recognition memory measures to what extent participants successfully stored and coded information. Respondents had to identify whether the presented statements about the Waiākea advertisement were true. The statements were derived from the advertisement and kept original or altered to test whether the respondents remembered the correct statements. This method has been applied by Hwang and Jeong (2021) before. Each statement offers three responses: true, false, and do not know. Do not know is analyzed as an incorrect answer. Additionally, respondents had to answer a multiple-choice question to identify which of the presented brands they had just seen in the TV advertisement. Four brand logos were presented, but only one was correct.

Besides purchase intention, ad credibility and ad attitude are also used to measure SA outcomes. First, Ohanian (1990) developed a measurement for ad credibility. The original measurement includes three items representing ad credibility: expertise, trustworthiness, and attractiveness. The current study has adapted this scale by adding class and dependability. Class and dependability are expected to be synonyms of attractiveness and trustworthiness. Respondent could assess the items from very low to very high. Secondly, ad attitude is measured with an adapted four-item scale created by Saadeghvaziri

et al. (2013). The scale measures ad attitude in general. The items are adapted to mobile advertisements, like "Overall, I liked the mobile advertisement."

The current studies used six measurements for the intrusiveness index. Threat to freedom was measured after ad attitude as the first measurement of the intrusiveness index. Hu and Wise (2021) used a scale to test the perceived threat to freedom towards advertisements based on three statements implemented by Gardner and Leshner (2016) and Youn and Kim (2019). The statements contribute to the mobile advertisement. For example, "This ad tried to make a decision for me." (Hu & Wise, 2021). Psychological reactance is the third item of the intrusiveness index and is measured through two constructs: negative cognitions (cognitive) and anger (affective) (Dillard & Shen, 2005). Negative cognitions include message fairness and are measured using a four-item measurement developed by Miller et al. (2007). The measurement included items like "The message was pleasant" and "The message got in the way of what I wanted." Gardner and Leisner (2016) measured anger with three items, initially focusing on a message. The items are modified for this research and focus on mobile advertisements: "To what extent did the mobile advertisement make you feel irritated/angry/annoyed?". The fourth measurement is designed by Li et al. (2002) for intrusiveness. It measures how respondents perceived the mobile advertisement based on seven items, for example, "disturbing" and "interfering" (Li et al., 2002). The fifth and sixth measurements assessed ad irritation. Brinson and Britt (2021) combined the measurement of Fritz (1979) and the measurement of Edwards et al. (2002) and adapted them to online advertisements. The scale of Fritz (1979) refers to online advertising. Respondents assessed online advertising based on seven items measuring irritation, attractiveness, and meaning. Lastly, Edwards et al. (2002) measured ad irritation from interrupting ads. Based on their measurement, respondents had to identify to what extent they agreed with four statements, like "It irritates me when an ad appears on an app I am using." All the items of the intrusiveness index are presented in Appendix B. To sum up, various outcomes from online advertising, like ad irritation and reactance, are incorporated. It was expected that these six measurements would be representative of intrusiveness.

Comprehension and counterarguing are measured after the intrusiveness index and belong to SA processing. Comprehension is evaluated through a self-reported measure of perceived comprehension. This approach is also applied by Jeong & Hwang (2012). Self-reported comprehension is measured by asking participants to what extent they understood the arguments made in the TV advertisement. Seven persuasive arguments from the Waiākea TV advertisement were included, for example, "Waiākea is making a difference, both for the environment and people in need around the world." The current study picked these arguments as they were believed to be most important. Next, counterarguing is measured with an adjusted measurement created by Moyer-Gusé & Nabi (2010). Respondents had to assess four statements: "While watching the Waiākea advertisement, I sometimes felt like I wanted to 'argue back'" or " While watching the Waiākea advertisement, I sometimes found myself thinking of ways I disagreed with what was being presented."

### 3.7 Reliability & validity

The following section explains all the decisions to ensure the current study's reliability and validity. A factor analysis is performed to test whether the items of the existing measurements belong together. A Cronbach's Alpha of at least 0.7 is required to ensure reliability. A factor analysis was used to ensure the reliability and validity of the scales implemented in this study. The Varimax with Kaiser Normalization Rotation method was used to test the survey items. Only items with a factor loading of minimal .5 were used. Together with Cronbach's Alpha validity analysis, the rotated component matrix presented in 1 is used as input for final scale development.

1 presents how measured items can be used for data analysis. Six scales remained original since all items were loaded in one component per scale. These scales were purchase intention (component six, Cronbach's Alpha  $\alpha = .91$ ), mobile ad attitude (component five,  $\alpha = .91$ ), ad credibility (component one,  $\alpha = .90$ ), ad irritation by Fritz (1979) (component two,  $\alpha = .82$ ), ad irritation by Edwards et al. (2002) (component eight,  $\alpha = .87$ ), and counterarguing (component nine,  $\alpha = .81$ ). All the scales presented above came from prior research and remain reliable in the current study.

The following scales were altered and improved based on factor loadings. The NASA-TLX was assessed as one component with three items. However, physical demand was added to ensure a higher Cronbach's Alpha of  $\alpha = .79$ . Physical demand was not included since it loaded in two different components. The measurement for recognition by Hwang and Jeong (2021) was implemented to measure recognition, including six items. However, the fourth and sixth items were removed. The fourth item loaded in two components, and the sixth item scored below .5. The final recognition compasses four items ( $\alpha = .73$ ). Furthermore, the comprehension scale (component four) did not load as one component either. Items one and two were removed from the final comprehension scale ( $\alpha = .82$ ). The second item had a factor loading below .5 and scored in two components. The first component did meet the above .5 criteria. However, it was removed from the final comprehension scale to improve Cronbach's Alpha. Until now, six scales have remained original and were not altered, and three scales were deconstructed because of factor loadings in different components or poor factor loadings.

The construction of a reliable intrusiveness index was most complex within the current study. It was intended to combine multiple scales to create one measurement for intrusiveness, ad irritation, threat to freedom, and psychological reactance. These negative emotions are all believed to be part of intrusiveness. The two scales for ad irritation remained as one component. The three other scales were widely spread among four different components. The final scale construction for the intrusiveness index scale happened as follows. Both ad irritation scales are included in the intrusiveness index. However, the current study considers intrusiveness more than just ad irritation. With this idea in mind, the following scale was constructed. The third scale includes "The message got in the way of what I wanted," item two of psychological reactance (Miller et al., 2007), and "interfering," "intrusive," "invasive," "pushy," "distracting," of the intrusiveness scale of Li et al. (2002). These items were

selected based on different iterations in a factor analysis that resulted in the strongest factor loadings and Cronbach's Alpha. The new intrusiveness scale has a reliability of  $\alpha = .87$  (Appendix A). The current study is aware that the new intrusiveness scale is created out of three unrelated subscales according to the factors analysis. However, the current study argues that these items sufficiently cover how the mobile ad interferes with the consumer's current behavior. As a result, threat to freedom was excluded from the intrusiveness scale. Psychological reactance item two covers threat to freedom since it measures how the mobile ad got in the way of what the respondent wanted. The intrusiveness scale is also expected to overlap with threat to freedom as it covers the mobile ad's invasive, intrusive, pushy, and distracting influences on the consumer. The intrusiveness index includes 16 items representing how consumers evaluated intrusiveness from the mobile advertisement.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Mental demand										.838					
Physical demand															.636
Temporal demand										.762					
Performance	.415*										.630*				
Effort										.835					
I will buy the product that was advertised in the Waiākea TV advertisement.					.811										
I desire to buy the product that was advertised in the Waiākea TV advertisement.					.867										
I will likely buy the product advertised in the Waiākea TV advertisement.					.866										
I plan to purchase the product that was advertised in the Waiākea TV advertisement.					.850										
Waiākea volcanic water is the first of its kind.											.588				
Our water is filtered through the purest charcoal in the deepest caves of Hawaii.											.570				
This volcanic process enhances the water with electrolytes.											.544				
For every liter you buy, Waiākea donates €10 to Doctors Without Borders.															.779*
Waiākea is making a difference, both for the environment and for people in need around the world.											.532				
So drink healthy and drink Waiākea to make the world a better place.											.433*				
Attractiveness	.725														
Classy	.831														
Dependability	.786														
Reliability	.781														
Expertise	.851														
Overall, I liked the mobile advertisement.					.817										
In general, I am favorable of the mobile advertisement.					.850										
I found the mobile advertisement a good thing.					.863										
The mobile advertisement was pleasant.					.809										
This ad tried to make a decision for me.													.735*		
This ad threatened my freedom to choose.													.717*		
I feel threatened when this ad got in the way of what I wanted.			.407*										.425*		
The message was pleasant.												.572*			
The message got in the way of what I wanted.			.719												
The message was reasonable.												.627*			
The message was fair.												.434*			

Irritated	.477*		.501*
Angry		.718*	
Annoyed		.598*	
Distracting	.607		
Disturbing		.725*	
Forced		.654*	
Interfering	.776		
Intrusive	.745		
Invasive	.542	.508	
Pushy	.617		
Positive/negative	.750		
Not irritating/irritating	.602		
Meaningful/pointless	.665		
Appealing/unappealing	.803		
Attractive/unattractive	.834		
Wonderful/awful	.783		
It irritates me when an ad appears on an app I'm using.		.768	
It irritates me when an ad pops up when I'm trying to watch a video online.		.860	
It irritates me when an ad obstructs the screen when I'm trying to read a news article.		.796	
It irritates me when an online video ad pops up with the sound on.		.629	
The water is naturally filtered through more than 14,000 ft of purest lava stones.	.509*		
This volcanic process enhances the water with electrolytes.	.488*		-.411*
Waiākea is then responsibly packaged, using 100% recycled plastic.	.699		
Waiākea is making a difference, both for the environment and people in need around the world.	.780		
For every liter you buy, Waiākea donates 650 liters of clean water to those without access through pump aid.	.733		
Waiākea is truly unlike any other.	.658		
So drink healthy, drink sustainably, drink ethically, drink Waiākea.	.761		
While watching the Waiākea TV advertisement, I sometimes felt like I wanted to 'argue back'.		.734	

While watching the Waiākea TV advertisement, I sometimes found myself thinking of ways I disagreed with what was being presented.	.747
While watching the Waiākea TV advertisement, I could not help thinking about ways that the information being presented was inaccurate or misleading.	.770
I found myself looking for flaws in how information was presented in the Waiākea TV advertisement.	.710

---

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

\* Not included in finale scale construction

*Table 1. Factor analysis – rotated component matrix*

## 4. Analysis and Results

### 4.1 Cognitive Load

A univariate analysis of variance was used to determine significant differences in mental workload (cognitive load) between respondents in the congruence and timing conditions. There was no evidence for differences in cognitive load between the simultaneous or delayed advertising conditions; therefore, H1 is rejected ( $F(1, 124) = 0.01, p = .937$ ). Also, incongruent and congruent advertising did not produce differences in mental workload ( $F(1, 124) = 0.51, p = .478$ ). Furthermore, the interaction effect between congruence and timing was statistically significant ( $F(1, 124) = 9.02, p = .003, \eta^2 = .07$ ). This is a medium effect according to Cohen's criterion (Cohen, 1988).

The interaction effect explains that the differences between the congruence conditions on cognitive load depend on timing. Alternatively, the differences between the timing conditions on mental workload depend on congruence. With this in mind, figure 5 shows the differences in mental workload among respondents throughout the conditions. The difference between incongruent and congruent advertising on cognitive load was biggest when the advertisements were timed simultaneously (congruent/simultaneous condition:  $N = 38, M = 8.53, SD = 3.75$  and incongruent/simultaneous condition:  $N = 30, M = 6.18, SD = 2.92$ ). On the other hand, the biggest differences in mental workload between the timing conditions were measured when the advertisements were incongruent (delayed/incongruent:  $N = 30, M = 8.13, SD = 3.90$ , simultaneous/incongruent:  $N = 30, M = 6.18, SD = 2.92$ ). Overall, congruence and timing had no main effects on cognitive load. Simultaneous advertising does not affect cognitive load differently compared to delayed advertising. Also, no differences in cognitive load were found between the congruence conditions. There was an interaction effect between timing and congruence on cognitive load.

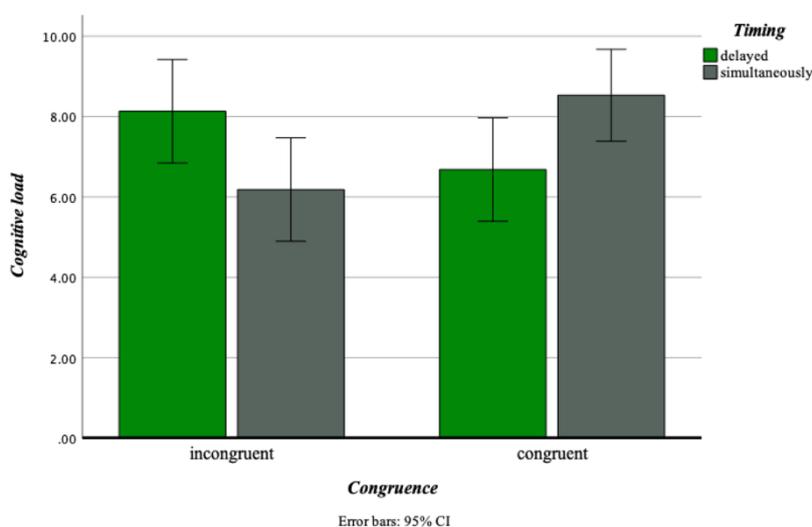


Figure 5. The impact of congruence and timing on cognitive load

## 4.2 SA Processing

The following section explains the results regarding SA processing. The conceptual framework explains that SA processing includes recognition, comprehension, counterarguing, and intrusiveness. Congruence and timing behaved differently than expected towards these variables. At the end of the section, it explains how intrusiveness and counterarguing are related.

### 4.2.1 Recognition

*H2* and *H3* propose the role of congruence and timing in recognition. An Analysis of Variance (ANOVA) was used to test this, and the model of recognition was significant ( $F(3, 124) = 3.13, R^2 = .48, p = .028$ ). There was only a main effect of congruence on recognition. *H2* is accepted since there is a significant difference between the incongruent and congruent condition on recognition ( $F(1, 124) = 4.87, p = .029, \eta^2 = .04$ ). A mean comparison between both congruence groups shows a difference of 0.08 (congruent advertising:  $N = 68, M = 1.04, SD = 0.20$ ; incongruent advertising:  $N = 68, M = 1.12, SD = 0.20$ ). This result means that respondents were more likely to recognize the advertisements when the mobile and TV advertisements were incongruent. As discussed earlier, there is no significant difference between simultaneous and delayed advertising on recognition; therefore, *H3* is rejected ( $F(1, 124) = 3.74, p = .055$ ). However, this finding shows a marginally significant effect. The direction indicates that if the difference between the timing conditions was significant, respondents were more likely to recognize the advertisement when the timing was delayed. Lastly, the effect of congruence on recognition is not affected by timing since no interaction effect was found ( $F(1, 124) = 0.83, p = .773$ ). The only significant finding regarding recognition is that recognition was highest in the incongruent condition.

### 4.2.2 Comprehension

Comprehension measured the extent to which respondents understood the target advertisement. Findings indicate that respondents did not understand the advertisements differently in the congruence and timing conditions. The main effect of congruence is not significant ( $F(1, 124) = 2.23, p = .138$ ). The answer to *RQ2* is that respondents did not perceive comprehension differently among the incongruent and congruent conditions. *H4* is rejected since timing has no significant main effect on comprehension ( $F(1, 124) = 0.12, p = .735$ ). Respondents did not comprehend the advertisement differently in the delayed and simultaneous conditions. Lastly, *RQ3* investigates an interaction effect between timing and congruence on comprehension. There is no significant interaction effect between congruence and timing on comprehension ( $F(1, 124) = 1.27, p = .262$ ). Altogether, no significant findings are found on the role of congruence and timing on comprehension.

### 4.2.3 Counterarguing

Unlike recognition and comprehension, counterarguing was expected to be decreased by both congruence and timing. The univariate analysis of variance shows no significant main or interaction effect between the variables. *H5* is rejected since there is no difference in counterarguing between congruent and incongruent advertising ( $F(1, 124) = 0.41, p = .526$ ). *H6* is rejected since there is no difference between simultaneous and delayed advertising on counterarguing ( $F(1, 124) = 0.18, p = .672$ ). Respondents did not make fewer counterarguments in the congruent condition compared to the incongruent condition. Simultaneously advertising did not result in fewer counterarguments than delayed advertising. The following section explains how counterarguing behaves in the current study's framework.

### 4.2.4 Intrusiveness

Intrusiveness is the fourth item of SA processing. No main or interaction effect was found in the role of congruence and timing on intrusiveness. The only significant finding presented below is a positive relationship between intrusiveness and counterarguing, which will be discussed at the end of this section. First, an ANOVA shows no significant difference between congruent and incongruent advertising on intrusiveness ( $F(1, 124) = 0.27, p = .608$ ). *H7* proposes that simultaneous advertising increases intrusiveness compared to delayed advertising. *H7* is rejected since there is no significant difference between simultaneous and delayed advertising on intrusiveness ( $F(1, 124) = 0.52, p = .470$ ). *H8* is also rejected; there is no evidence of an interaction effect ( $F(1, 124) = 0.11, p = .740$ ). Lastly, a linear regression analysis investigated the relationship between intrusiveness and counterarguing. *H9* is accepted since there was a positive relationship between intrusiveness and counterarguing ( $F(1, 126) = 13.27, p < .001, R^2 = .09, \beta = .16$ ). Nine percent of the variance in counterarguing is explained by intrusiveness. This means that when respondents perceive more intrusiveness, counterarguing will also increase. However, this relationship is weak, considering a standardized regression coefficient of  $\beta = .16$ . To conclude, respondents did not perceive different intrusiveness between the congruent and timing conditions. There is a weak positive relationship between counterarguing and intrusiveness, and intrusiveness is expected to predict counterarguing.

## 4.2 The role of congruence and timing on SA Outcomes

The following section explains the findings regarding the role of congruence and timing on purchase intention, ad credibility, and ad attitude. ANOVAs are used to test the relationships below. Moving on to purchase intention, the current study considers purchase intention to be the most important determinant of SA effectiveness. *H10* and *H11* propose the effect of congruence and timing on purchase intention. Nevertheless, only *H10* is accepted. There is a significant difference between the

congruent and incongruent condition on purchase intention ( $F(1, 124) = 4.05, p = .046$ ). Respondents from the incongruent condition scored higher on purchase intention than respondents from the congruent condition ( $M = 2.53$  vs.  $M = 2.11$ ). Purchase intention was highest among the incongruent/delayed condition ( $M = 2.73$  vs.  $M = 2.32$ ). Additionally, *H11* is rejected since there is no difference in purchase intention between the timing conditions ( $F(1, 124) = 1.94, p = .166$ ). These results indicate that respondents are more likely to purchase the advertised product when the advertisements are incongruent, particularly incongruent and delayed.

Based on prior research, ad credibility is expected to behave similarly to purchase intention. Despite that, no significant findings were found on the role of congruence and timing on ad credibility. *H12* is rejected; respondents did not find congruent advertisements more credible than incongruent advertisements, and no differences were found between the congruent conditions on ad credibility ( $F(1, 124) = 3.28, p = .877$ ). There were also no differences in ad credibility between the timing conditions. *H13* is rejected; simultaneous advertising does not result in higher ad credibility than delayed advertising ( $F(1, 124) = 0.02, p = .877$ ). Altogether, simultaneous timing and congruent advertisements did not increase ad credibility differently. Respondents did not find the TV advertisement more or less credible throughout the four conditions.

Mobile ad attitude is the third outcome that measures SA effectiveness and is tested similarly to ad credibility and purchase intention. The ANOVA resulted in no significant main effects or an interaction effect. *H14* is rejected ( $F(1, 124) = 1.94, p = .166$ ) since there is no difference between respondents in the congruent and incongruent condition on mobile ad attitude. Simultaneously timing and timing with a delay resulted in no different ad attitudes. Considering this, *H15* is rejected ( $F(1, 124) = 0.230, p = .632$ ). Overall, there was a low score for mobile ad attitude, and low scores reflect unfavorable attitudes toward the mobile advertisements ( $M = 2.42, SD = 1.34$ ): incongruent and delayed ( $M = 2.51$ ), incongruent and simultaneously ( $M = 1.97$ ), congruent and delayed ( $M = 2.41$ ), congruent and simultaneously ( $M = 2.73$ ). Lastly, there was no significant interaction between congruence and timing ( $F(1, 124) = 3.30, p = .072$ ). The current study considers this finding as marginally significant. If the interaction effect had been significant, the difference between congruent and incongruent advertising would have been the biggest when the ads were timed simultaneously. To conclude, congruence and timing did not result in different mobile ad attitudes between the conditions.

#### **4.3 The transition between SA processing and SA outcomes**

The following section has the same structure as the section presented above. Purchase intention, ad credibility, and ad attitude are discussed in consecutive order. These variables, presented as SA outcomes, were tested using a multiple linear regression analysis. *H16*, *H17*, and *H18* have the same structure. Purchase intention, ad credibility, and ad attitude were expected to be positively affected by

(a) comprehension, (b) recognition, and negatively affected by (c) counterarguing and (d) intrusiveness.

The information presented below helps to understand how SA processing and purchase intention are related. Results give a significant model ( $F(4, 123) = 4.87, p = .001, R^2 = .14$ ). However, since counterarguing ( $t = -0.57, \beta = -.05, p = .568$ ) and intrusiveness ( $t = -0.28, \beta = -.03, p = .781$ ) did not decrease purchase intention, *H16* is rejected. In contrast, comprehension and recognition were positively related to purchase intention. Comprehension positively predicts purchase intention ( $t = 2.46, \beta = .21, p = .015$ ). This relationship is weak, considering the standardized regression coefficient of  $\beta = .21$ . Additionally, recognition also positively predicts purchase intention ( $t = 3.06, \beta = .27, p = .003$ ). The positive linear regression explains that an increase in recognition and comprehension results in higher purchase intention. An increase in intrusiveness and counterarguing did not decrease purchase intention.

*H17* proposes that ad credibility is predicted positively by (a) comprehension and (b) recognition and negatively by (c) counterarguing and (d) intrusiveness. A multiple linear regression analysis helped to discover these relationships. Results show a significant model given  $p < .001$  ( $F(4, 123) = 15.38, R^2 = .33$ ). This means that the model explains 33% of the variance in ad credibility. However, *H17* is rejected because there is no evidence that counterarguing ( $t = -1.39, \beta = -.11, p = .167$ ) and intrusiveness ( $t = 2.26, \beta = .18, p = .025$ ) negatively predict ad credibility. While *H17* is rejected, a change in ad credibility is explained by comprehension, recognition, and intrusiveness. Recognition has the strongest linear relationship with ad credibility ( $t = 5.78, \beta = .45, p < .001$ ). This means that high recognition levels result in high ad credibility. Comprehension also positively predicts ad credibility ( $t = 2.59, \beta = .20, p = .011$ ). Respondents who perceived high comprehension were more likely to perceive high ad credibility. Likewise, intrusiveness is also positively related to ad credibility. This indicates that when intrusiveness increases, ad credibility increases as well. To review, ad credibility positively relates to recognition, comprehension, and intrusiveness. The positive relationship between ad credibility and intrusiveness was not expected. Results indicate that SA processing positively predicts ad credibility, as 33% of the variance in ad credibility is explained by SA processing.

At last, unlike the previous hypotheses, mobile ad attitudes focus on mobile advertisements rather than TV advertisements. *H18* proposes that mobile ad attitude is predicted positively by (a) comprehension and (b) recognition and negatively by (c) counterarguing and (d) intrusiveness. The model was insignificant ( $F(4, 123) = 1.19, p = .319$ ). This means that SA processing does not predict mobile ad attitude. Mobile ad attitude behaves differently than expected. The study's analysis found no significant findings regarding mobile ad attitude.

#### 4.4 Cognitive load as a mediator for congruence

The following hypothesis focuses on the role of cognitive load as a mediator. H18 proposes that cognitive load mediates the relationship between congruence and (a) comprehension, (b) recognition, and (c) counterarguing. H19 and H20 use the same statistical model (PROCESS Model 4). All the relationships visualized in figure 6 should be significant to prove that cognitive load is a mediator. The dotted lines represent insignificant relationships, and the continuous lines represent significant relationships. Numbers 1, 2, and 3 show the steps to establish a mediation; a mediation is ruled out once one of these relationships is insignificant.

The first requirement for mediation is to show a significant relationship between the causal variable and outcome variable to establish an effect that may be mediated (Kenny, 2023). The only significant result is the regression between congruence and recognition (step 1). There is a significant total effect of  $p = .021$  ( $F(1, 126) = 5.42, \beta = -.41$ ). Subsequently, congruence should correlate with cognitive load. This relationship is the same throughout H19a/b/c, as presented in figure 6. However, congruence and cognitive load are not related. Based on this, H19 is rejected since no mediation is possible ( $F(1, 126) = 0.74, p = .390$ ). Cognitive load is no mediator between congruence, recognition, comprehension, and counterarguing.

Even though the mediation analysis is unsuccessful, there is a total effect. This total effect explains that when congruence increases, recognition decreases, considering a negative standardized coefficient ( $\beta = -.41$ ). Congruent advertising results in lower recognition, as the congruence variable is coded from incongruent to congruent. This result aligns with the main effect of congruence on recognition, presented earlier in this results section. Respondents were less likely to recognize the advertisement in the congruent condition than the incongruent condition.

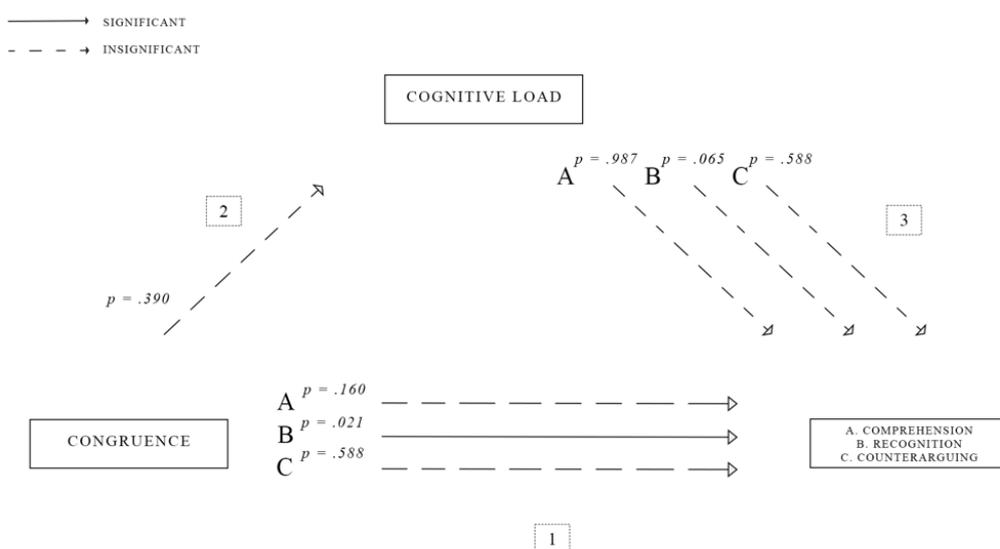


Figure 6. Mediation overview H19 - congruence

#### 4.5 Cognitive load as a mediator for timing

*H20* proposes that cognitive load mediates the relationship between timing and (a) comprehension, (b) recognition, and (c) counterarguing. The PROCESS macro tool by Hayes was used to test this hypothesis. Figure 7 shows all the relationships of the mediation analysis. The dotted lines represent insignificant relationships, and continuous lines represent significant relationships. Numbers 1, 2, and 3 show the steps to take in order to establish a mediation. A mediation is ruled out once one of these relationships is not significant.

The only relationship between the causal and outcome variables is timing and recognition (step 1). There is a significant total effect of  $p = .038$  ( $F(1, 126) = 3.59$ ,  $\beta = -.36$ ). Subsequently, there should be a correlation between timing and cognitive load as a second requirement for a mediation (step 2, figure 7). However, there is no significant relationship between timing and cognitive load ( $F(1, 126) = 0.02$ ,  $p = .892$ ). This result is the same among recognition, comprehension, and counterarguing; no mediation is possible, and *H20* is rejected. Cognitive load is no mediator between timing and recognition, comprehension, and counterarguing.

The total effect between timing and recognition represents a negative regression ( $\beta = -.36$ ). This means that timing negatively predicts recognition. In other words, consumers were less likely to remember the advertisement when the advertisements were timed simultaneously. This finding supports the earlier discussed marginally significant main effect of timing on congruence ( $p = .055$ ). This main effect showed that if the difference between the timing conditions was significant, respondents were more likely to recognize the advertisement when the timing was delayed. The total effect of this mediation analysis confirms the assumption that recognition increases when the timing is delayed.

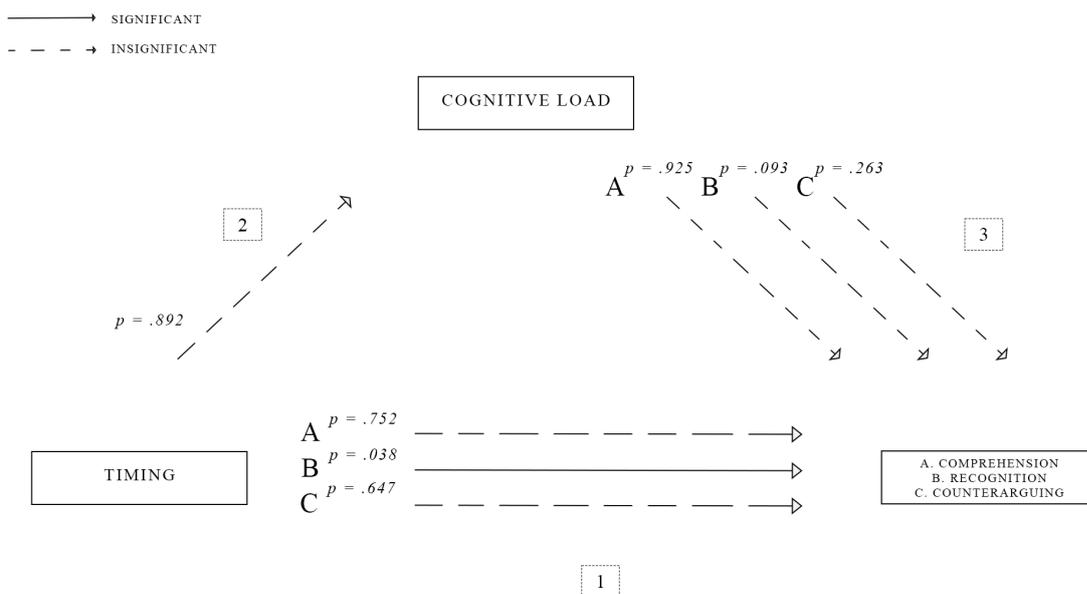


Figure 7. Mediation overview *H20* – timing

#### 4.6 Additional analysis

The additional analysis includes one test the analysis performed above did not cover. 2 gives an overview of links in regressions between purchase intention (dependent variable) and cognitive load, recognition, counterarguing, comprehension, intrusiveness, ad attitude, ad credibility, timing, and congruence. This analysis shows to what extent all the relevant variables for advertising processing relate to purchase intention. The variables predict 27% of the variance in purchase intention. The overview shows that when all the non-demographic variables are included, purchase intention is significantly related to cognitive load ( $t = 2.93, \beta = .25, p = .004$ ) and comprehension ( $t = 2.14, \beta = .18, p = .034$ ). The relationship between cognitive load and purchase intention indicates that respondents were more likely to purchase the product when they perceived a high cognitive load. Additionally, comprehension positively relates to purchase intention. The current study expects that purchase intention increases when comprehension increases.

	$\beta$
<i>Cognitive Load</i>	.25
<i>Recognition</i>	.11
<i>Counterarguing</i>	-.06
<i>Comprehension</i>	.18
<i>Intrusiveness</i>	-.01
<i>Ad Attitude</i>	.11
<i>Ad Credibility</i>	.17
<i>Timing</i>	-.10
<i>Congruence</i>	.14

*Dependent variable: Purchase Intention,*  
*Model:  $F(9, 118) = 4.89, p < .001, R^2 = .27$*

**Table 2.** Multiple linear regression purchase intention congruence and timing

## 5. Discussion

The present study shows that the combination of congruence and timing, which is fundamental for synced advertising (SA), is less beneficial for SA effectiveness than expected. This finding contradicts prior research showing the promising effects of SA, like repeated exposure or increased interest (Segijn et al., 2021). Additionally, Segijn and Voorveld (2021) state that brand interest from SA was higher than brand interest from non-synced advertising. However, the current study cannot confirm this. The section below discusses why SA was not effective.

### 5.1 Cognitive load: a barrier to synced advertising effectiveness

I argue that the cognitive load consumers perceive from SA reduces information processing, resulting in lower recognition and purchase intention. Consumers perceived the highest cognitive load in the congruent/simultaneous and incongruent/delayed advertising conditions. However, it can be seen that people are more likely to recognize and purchase the advertised brand when the advertisements are incongruent and timed with a delay. The finding regarding cognitive load being a threat to SA aligns with Segijn's (2019) study. She identified capacity interference as a possible barrier to synced advertising. For example, cognitive learning theories explain that exposure to multiple sources simultaneously can limit information processing and cognitive performance (Lang, 2002; Mayer & Moreno, 2003; Salvucci & Taatgen, 2010). To the knowledge of the current study, it has not been identified that cognitive load positively relates to purchase intention in a media multitasking environment. Below, it is explained how cognitive load stimulates and obstructs advertisement processing based on cognitive learning theories.

Congruent and simultaneously timed advertisements create a mental workload that reduces SA effectiveness. Based on the cognitive theory of multimedia learning (Mayer & Moreno, 2003), it is likely that the amount of information respondents had to process simultaneously obstructs the working memory. Additionally, exposure to multiple sources simultaneously can overload information channels and decrease information processing (Lang, 2002; Salvucci & Taatgen, 2010). Respondents in the congruent/simultaneous condition were exposed to the congruent mobile advertisement while simultaneously seeing the target TV advertisement. The target TV advertisement included music, images, and eight persuasive arguments. All in all, respondents were exposed to a quantity of words and images that were beyond their available capacity. A task that exceeds the available cognitive capacity results in a cognitive overload (Kahneman, 1973). As a result, the amount of information consumers could process was limited, and SA processing was less effective.

In contrast, respondents in the incongruent/delayed condition were exposed to the incongruent mobile advertisement presented with a delay. I argue that the information respondents had to process in the incongruent/delayed condition was less demanding for their working memories. The quantity of words and images was lower since the advertisements were incongruent and timed with a delay. The

TV advertisement they saw while being exposed to the incongruent mobile advertisement contained only music and images. Until now, an increase in cognitive load was expected to reduce recognition (Armstrong & Chung, 2020; Jeong & Hwang, 2016). However, the present study shows that consumers recognized and wanted to purchase the advertised product while perceiving high cognitive load in the incongruent/delayed condition. These results build on existing evidence of the Yerkes-Dodson Law. The Yerkes-Dodson law describes the relationship between arousal and performance (Teigen, 1994). Performance refers to the advertising processing of consumers within the current study. Based on this theory, it is likely that a moderate level of arousal from incongruent and delayed advertising results in high purchase intention and recognition among consumers. In other words, arousal was on a level that improved information processing among respondents. Additionally, the theory describes that too much or too little arousal can decrease advertising processing effectiveness, resulting in boredom (low arousal) or high anxiety (high arousal). With this in mind, it is possible that SA triggered high arousal, which resulted in less effective SA processing. However, reduced information processing during SA is explained differently for now. To conclude, the cognitive load people perceived in the incongruent/delayed condition benefited advertising processing. Consumers were more likely to recognize and buy the advertised product within this condition.

## **5.2 Related advertising outcomes**

### ***5.2.1 Counterarguing and Intrusiveness***

The current study expects that intrusiveness creates negative emotions that could motivate consumers to make more counterarguments against advertisements. Intrusiveness produces adverse evaluative outcomes like irritation and anger (Li et al., 2002; Youn & Kim, 2019). The current study's findings show that intrusiveness caused by mobile advertisements makes consumers counterargue more against TV advertisements. This indicates that consumers do not necessarily attribute intrusiveness to one source and that this feeling can create an adverse ad response. Furthermore, Segijn (2019) stated that awareness of SA practices creates suspicion and reactance. Consumers did not feel intruded more on by synced advertising than non-synced advertising within this study. Neither did consumers counterargue more against synced advertising. Intrusiveness and counterarguing do not decrease brand interest among consumers within the multi-screening context of this study. Instead, intrusiveness is positively related to ad credibility. Prior research states that consumers' ad irritation and intrusiveness increase ad avoidance and reactance toward online advertisements (Brinson & Britt, 2021; Youn & Kim, 2019). Therefore, intrusiveness could make the consumer avoid mobile advertisements more within the present study. Additionally, the negative feelings evoked by the mobile advertisement could make the consumer think that the TV advertisement is less harmful, which could trigger positive feelings. These positive feelings could make the consumer perceive the TV advertisement as more credible.

### **5.2.2 Advertising outcomes**

Comprehension and cognitive load are positively related to purchase intention within this research. The positive relationship between purchase intention and cognitive load has been discussed before. The relationship between comprehension and purchase intention is reflected in previous studies. It can be argued that the strength of comprehension comes from its relevance in persuading the consumer (Jeong & Hwang, 2015). Comprehension is crucial for persuasion as it is needed to understand the advertisement message (Lang, 2000). I argue that comprehension positively predicts purchase intention. This would suggest that respondents are more likely to purchase the product when comprehension increases. Comprehension is related to purchase intention, as message understanding is relevant in persuading the consumer (Jeong & Hwang, 2015). A well-comprehended message is argued to increase purchase intention.

Furthermore, recognition and ad credibility are positively related. I expect that recognition positively affects ad credibility and not the other way around. According to Alter and Oppenheimer (2009), highly recognizable ads are more liked. Based on these findings, the results of the current study suggest that when consumers are more likely to recognize the brand, the ad is more liked, which increases ad credibility. Additionally, Segijn and Voorveld (2021) highlighted the potential of repeated exposure in SA on ad credibility and ad attitude. Repetition of single advertisement messages on different media can increase ad attitude and ad credibility (Harkins & Petty, 1981; Voorveld et al., 2011). However, the current study cannot confirm this potential.

Cognitive load does not explain the relationship between comprehension, recognition, and counterarguing with timing and congruence. Cognitive load was expected to mediate this relationship based on prior research. For example, the LC4MP (Lang, 2000) explains that people have a limited capacity to process mediated messages. However, the interaction effect between timing and congruence on cognitive load indicates that the effect of congruence on cognitive load depends on timing. Individually, their influence is not strong enough to predict cognitive load within the current study. Timing and congruence create SA, which increases cognitive load. They do not directly affect cognitive load. This result does not suggest that congruence and timing are not of value to cognitive load. As we suggested earlier, cognitive load behaves differently than expected, and congruence and timing depend on each other to what extent they affect cognitive load.

### **5.3 Practical implications**

The findings of the present study have important implications for practitioners. Marketers should be selective with synced advertising. The current study showed that SA was not as effective as expected. In contrast, consumers scored higher on purchase intention and recognition when experiencing non-synced advertising. Respondents were more likely to purchase the advertised product when the advertisements were incongruent and delayed. The current study does not recommend practitioners

use SA, as further research is needed to understand how consumers respond to it better. For now, non-synced advertising is more effective in increasing purchase intention and recognition. This means that advertisements should be delayed and incongruent.

Marketers are advised to consider the current study's findings regarding cognitive load. The findings show that the combination of congruence and advertising in SA will likely increase cognitive load to the degree that negatively affects brand interest. It could be crucial for marketers to collaborate with scientists and psychologists from the field of consumer psychology to investigate this threat further. Understanding cognitive load creates opportunities as it can increase brand interest as well. Decreasing the adverse effects of cognitive load could create new opportunities in SA effectiveness.

Marketers are recommended to develop an advertisement message that is easy to understand by the consumer. The current study shows that well-comprehended advertisements could increase purchase intention and ad credibility. Ad credibility is important for brands as consumers are likelier to trust the brand. Therefore, marketers are advised to create an understanding of how their brand can become more recognizable within a multi-screening context.

#### **5.4 Theoretical implications**

With the results of this study, other scientists could gain more insight into how congruence and timing behave toward synced advertising effectiveness. The current study used the Yerkes & Dodson Law (Teigen, 1994) and the Cognitive Theory of Multimedia Learning (Mayer & Moreno, 2003) to explain how the cognitive load is likely to have created differences in advertising processing between non-synced and synced advertising. The current study is the first to have used this approach in a multi-screening context.

Examining the role of cognitive load in an SA environment is new within synced advertisements. Segijn (2019) has identified structural interference as a possible barrier to synced advertising. Additionally, scientists showed that multi-screening creates structural interference, negatively affecting advertising processing (Segijn & Van Voorveld, 2021; Van Cauwenberge et al., 2014; Jeong & Hwang, 2016). The current study adds new insights into how synced and non-synced advertisements could create different types of cognitive load. These insights show that cognitive load can threaten SA since it makes SA processing less effective. As a result, recognition and purchase intention were lower than in the non-synced advertising condition. It could be crucial to understand how and when the available cognitive capacity of consumers is exceeded, which decreases SA processing effectiveness. It is vital to both marketers, scientists, and the consumer to understand better the adverse effects of an increased cognitive load on SA effectiveness.

Prior research on SA has examined congruence and timing before. For example, Segijn et al. (2017) showed that related multi-screening improved brand memory and brand attitude more than unrelated multi-screening. Additionally, Segijn et al. (2021) found that the mobile ad received the

most attention when timed simultaneously or shortly after the TV advertisement. However, the current study combined congruence and timing within one experiment and presented a critical reflection that contradicts the positive pre-existing beliefs about SA. Based on prior research, a wide variety of variables was used to test and assess SA effectiveness, like recognition (Hwang & Jeong, 2021), counterarguing (Moyer-Gusé & Nabi, 2010), and purchase intention (Alalwan, 2018). This study helps researchers understand that SA is not always better than non-synced advertising.

## **5.5 Limitations and Future Research Directions**

The current study's experimental examination of synced advertising effectiveness has its limitations. It is expected that the operationalization of the experiments limits this research. Most respondents conducted the experiment in person, mostly in their homes ( $N = 113$ ). Being at home while experimenting allows for a realistic setting, a strength and weakness of this research. It strengthens the research by facilitating ecological validity. Conducting experiments at respondents' homes makes them feel comfort, allowing them to behave naturally. However, there is no control over external influences. Ideally, external distractions that can affect the respondent are eliminated within an experiment. Within the current study, it is argued that external distractions like children and outdoor- and indoor sounds (household atmospheres) could have affected the focus of respondents. Decreased focus can negatively affect comprehension, cognitive load, and general performance of the experiment. For example, respondents could have perceived a high workload of the experiment while being unconsciously affected by their environment. Future scientists are recommended to adapt this experimental design as a fundament for new studies regarding SA. The current study expects that respondents did not hold pre-existing beliefs regarding the brands. Additionally, the mobile advertisements were programmed in an environment that allowed complete control over the exact timing of the pop-up advertisement. The mobile ads' design is neutral, giving a realistic representation of a mobile advertisement.

The observations during the experiment showed that many respondents barely looked at the mobile advertisement. Unfortunately, the current study has not identified whether respondents have seen the mobile advertisement. Nevertheless, when respondents were asked whether they clicked on the "click here" button, it was often answered with "Which mobile advertisement?" and "Did I close the mobile advertisement?". Complementing characteristics are important to SA, and congruence is created by two advertisements that complement each other (Segijn, 2019). The complementing characteristics refer to the content of the advertisements, so the ads promote the same brand. This congruency improves brand interest (Yoo, 2009). However, the potential of congruent advertisements has not been proven within this research. Even though this is likely to reflect reality, data is expected to be limited by this. Especially questions regarding the content of the mobile advertisement could

have been limited by this. Respondents might not have seen the content and cannot properly answer the questions regarding the mobile advertisement.

More limits are found in the self-reported measure of comprehension. A self-reported measure relies on the assessment of the respondent. The comprehension measurement asked respondents to determine to what extent they understood a statement that had been made. Social desirability can affect this assessment. Even though the answers were anonymized, respondents could fear the social pressure of succeeding. In this case, it could suggest that respondents would make it appear that they comprehended more than they did. Scientists are recommended to use a measurement for comprehension that is not likely to be affected by social desirability in future research.

This study has important implications for practitioners of synced advertising and multi-screening. Future research should contribute to a different measurement of cognitive load in synced advertising. The NASA-TLX is a well-known and accurate measurement. However, a different approach that includes measuring brain activity and stress hormones during SA could contribute to a better understanding of cognitive load. For example, an electroencephalogram measures brain activity (Johns Hopkins Medicine, 2023). However, psychological measures like this have not been implemented as they go beyond the expertise of the current study. This research showed that cognitive load behaved differently than expected. A better understanding of cognitive load is important to tackle possible issues that limit SA perception and effectiveness.

Lastly, recognition is only positively related to purchase intention when testing it with comprehension, counterarguing, and intrusiveness. When considering the greater scope of this research and testing the multiple linear regression with all the relevant variables with purchase intention, recognition seems to be insignificant. The current study only shows to what extent these variables are related. Therefore, further claims about why the influence of recognition on purchase intention decreases when incorporating other variables cannot be made. More precisely, it remains unknown which variables mainly decrease recognition's influence on purchase intention. Scientists are advised to consider this future research direction. Future research could perform an experiment wherein comprehension, counterarguing, and intrusiveness are manipulated. Different manipulations and conditions could identify which variables affect the relationship between recognition and timing. Additionally, a mediation analysis could explain whether the relationship between recognition and purchase intention is explained by comprehension, counterarguing, or intrusiveness. A deeper understanding of this topic can help marketers build an environment where recognition increases purchase intention.

## 5.6 Conclusion

This research aimed to determine the role of congruence and timing in synced advertising effectiveness. The current study's findings show that the role of congruence and timing in SA effectiveness is less prominent than expected. Contrary to prior research, consumers scored higher brand interest when the advertisements were incongruent and delayed. The current study sheds new light on cognitive load in SA since it considers cognitive load to obstruct SA effectiveness. The cognitive load consumers perceive from SA limits SA's effectiveness. This workload obstructs information processing since images and words from multiple sources simultaneously overload information channels (Mayer & Moreno, 2003). Based on the Yerkes-Dodson law (1908), the current study argues that purchase intention and recognition were positively influenced. A moderate level of arousal improves purchase and recognition among consumers in the incongruent/delayed condition. Consumers perceived high cognitive load by a combination of congruence and timing. The effect of congruence on cognitive load is predicted by timing.

Additional findings show relationships between variables that help to understand how consumers process information in a media multitasking environment. Cognitive load and comprehension are both predicting purchase intention. It is argued that an increased cognitive load results in higher purchase intention. The amount of cognitive load aroused the consumers in a way that improved their information processing. Furthermore, consumers were more likely to buy the advertised product when comprehension increased. Comprehension is essential for purchase intention, as message understanding is relevant in persuading the consumer (Jeong & Hwang, 2015). It is concluded that SA did not result in higher intrusiveness. However, consumers were more likely to counterargue against the TV advertisement because of feelings of intrusiveness from the mobile advertisement.

The current study presents a contribution to the field of SA with a new understanding of how cognitive load obstructs SA effectiveness. Scientists could use these findings as a stepping stone for further exploration of SA and the role of cognitive load on SA effectiveness. For now, marketers are advised to wait with the adoption of SA in their advertising strategy. The current study concludes that optimization of SA is required as non-synced advertising results in higher brand interest than synced advertising.

## References

- Acquisti, A., John, L. K., & Loewenstein, G. (2013). What Is Privacy Worth? *The Journal of Legal Studies*, 42(2), 249–274. <https://doi.org/10.1086/671754>
- Alalwan, A. A. (2018). Investigating the impact of social media advertising features on customer purchase intention. *International Journal of Information Management*, 42, 65–77. <https://doi.org/10.1016/j.ijinfomgt.2018.06.001>
- Alter, A. L., & Oppenheimer, D. M. (2009). Uniting the Tribes of Fluency to Form a Metacognitive Nation. *Personality and Social Psychology Review*, 13(3), 219–235. <https://doi.org/10.1177/1088868309341564>
- Alter Eco Foods. (2022). *Alter Eco Foods*. Retrieved March 27, 2022, from <https://www.alterecofoods.com>
- Armstrong, G. B., & Chung, L. (2000). Background television and reading memory in context: Assessing TV interference and facilitative context effects on encoding versus retrieval processes. *Communication Research*, 27(3), 327–352.
- Baddeley, A. (1998). Working memory. *Comptes Rendus De L'Académie Des Sciences - Series III - Sciences De La Vie*, 321, 167–173. [https://doi.org/10.1016/s0079-7421\(08\)60452-1](https://doi.org/10.1016/s0079-7421(08)60452-1)
- Baron, R. A., Baron, P. H., & Miller, N. (1973). The relation between distraction and persuasion. *Psychological Bulletin*, 80(4), 310–323. <https://doi.org/10.1037/h0034950>
- Bolls, P. D., & Muehling, D. D. (2007). The effects of Dual-Task processing on consumers' responses to High- and Low-Imagery radio advertisements. *Journal of Advertising*, 36(4), 35–47. <https://doi.org/10.2753/joa0091-3367360403>
- Books and literacy in the digital age. (2010). *American Libraries*, 41(8), 34–37.
- Brehm, S. S., & Brehm, J. W. (1981). *Psychological Reactance: A Theory of Freedom and Control*. Academic Press New York.
- Brinson, N. H., & Britt, B. C. (2021). Reactance and turbulence: examining the cognitive and affective antecedents of ad blocking. *Journal of Research in Interactive Marketing*, 15(4), 549–570. <https://doi.org/10.1108/jrim-04-2020-0083>

- Chang, Y., & Thorson, E. (2004). TELEVISION AND WEB ADVERTISING SYNERGIES. *Journal of Advertising*, 33(2), 75–84. <https://doi.org/10.1080/00913367.2004.10639161>
- Cohen, J. W. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: Lawrence Erlbaum Associates, 2nd edn.
- Cohen, L., Manion, L., & Morrison, K. (2007). Research methods in education. In *Routledge eBooks*. <https://doi.org/10.4324/9780203029053>
- Dijkstra, M., Buijtel, H. E., & Van Raaij, W. (2005). Separate and joint effects of medium type on consumer responses: a comparison of television, print, and the Internet. *Journal of Business Research*, 58(3), 377–386. [https://doi.org/10.1016/s0148-2963\(03\)00105-x](https://doi.org/10.1016/s0148-2963(03)00105-x)
- Dillard, J. P., & Shen, L. (2005). On the Nature of Reactance and its Role in Persuasive Health Communication. *Communication Monographs*, 72(2), 144–168. <https://doi.org/10.1080/03637750500111815>
- Egeth, H. E., & Kahneman, D. (1973). Attention and effort. *American Journal of Psychology*, 88(2), 339. <https://doi.org/10.2307/1421603>
- Fritz, N. K. (1979). Claim recall and irritation in television commercials: An advertising effectiveness study. *Journal of the Academy of Marketing Science*, 7(1–2), 1–13. <https://doi.org/10.1007/bf02721908>
- Gao, Y., & Zhao, L. (2021). Synergistic Effect Between Online Broadcast Media and Interactive Media on Purchase Intention. *Frontiers in Psychology*, 12. <https://doi.org/10.3389/fpsyg.2021.781743>
- Gardner, L., & Leshner, G. (2015). The Role of Narrative and Other-Referencing in Attenuating Psychological Reactance to Diabetes Self-Care Messages. *Health Communication*, 31(6), 738–751. <https://doi.org/10.1080/10410236.2014.993498>
- Geuens, M., & De Pelsmacker, P. (2017). Planning and conducting experimental advertising research and questionnaire design. *Journal of Advertising*, 46(1), 83–100. <https://doi.org/10.1080/00913367.2016.1225233>

- Gevorgyan, G., & Manucharova, N. (2015). The effects of cultural appeal, product involvement, and ethnic identity on attitudes and recall in online advertising. *Chinese Journal of Communication*, 8(2), 196–220. <https://doi.org/10.1080/17544750.2015.1014518>
- Harkins, S. G., & Petty, R. E. (1981). Effects of source magnification of cognitive effort on attitudes: An information-processing view. *Journal of Personality and Social Psychology*, 40(3), 401–413. <https://doi.org/10.1037/0022-3514.40.3.401>
- Hart, S. G., & Staveland, L. E. (1988). Development of NASA-TLX (Task Load Index): Results of empirical and theoretical research. In *Advances in psychology* (pp. 139–183). [https://doi.org/10.1016/s0166-4115\(08\)62386-9](https://doi.org/10.1016/s0166-4115(08)62386-9)
- Hu, X., & Wise, K. (2021). How playable ads influence consumer attitude: exploring the mediation effects of perceived control and freedom threat. *Journal of Research in Interactive Marketing*, 15(2), 295–315. <https://doi.org/10.1108/jrim-12-2020-0269>
- Huang, Y., & Yoon, H. J. (2022). Prosocial native advertising on socialmedia: effects of ad-context congruence, ad position and ad type. *Journal of Social Marketing*, 12, 106–123. <https://doi.org/10.1108/JSOCM-05-2021-0105>
- Hwang, Y. W., & Jeong, S. (2021). Consumers' response to format characteristics in native advertising. *Journal of Advertising Research*, 61(2), 212–224. <https://doi.org/10.2501/jar-2020-022>
- Janssens, W., De Pelsmacker, P., & Geuens, M. (2012). “Online advertising and congruency effects: it depends on how you look at it. *International Journal of Advertising*, 31, 579–604.
- Jeon, Y. A., Son, H., Chung, A. D., & Drumwright, M. E. (2019). Temporal Certainty and Skippable In-Stream Commercials: Effects of Ad Length, Timer, and Skip-ad Button on Irritation and Skipping Behavior. *Journal of Interactive Marketing*, 47, 144–158. <https://doi.org/10.1016/j.intmar.2019.02.005>
- Jeong, S. H., & Hwang, Y. (2012). Does Multitasking Increase or Decrease Persuasion? Effects of Multitasking on Comprehension and Counterarguing. *Journal of Communication*, 62(4), 571–587. <https://doi.org/10.1111/j.1460-2466.2012.01659.x>

- Jeong, S. H., & Hwang, Y. (2015). Multitasking and Persuasion: The Role of Structural Interference. *Media Psychology, 18*(4), 451–474. <https://doi.org/10.1080/15213269.2014.933114>
- Jeong, S. H., & Hwang, Y. (2016). Media Multitasking Effects on Cognitive vs. Attitudinal Outcomes: A Meta-Analysis. *Human Communication Research, 42*(4), 599–618. <https://doi.org/10.1111/hcre.12089>
- John Hopkins Medicine. (2023). *Electroencephalogram (EEG)*. <https://www.hopkinsmedicine.org/health/treatment-tests-and-therapies/electroencephalogram-ee#:~:text=An%20EEG%20is%20a%20test,activity%20of%20your%20brain%20cells>.
- Kenny, D. (2023). *Mediation*. <https://davidakenny.net/cm/mediate.htm>
- Kouider, S., & Dehaene, S. (2007). Levels of processing during non-conscious perception: a critical review of visual masking. *Philosophical Transactions of the Royal Society B: Biological Sciences, 362*(1481), 857–875. <https://doi.org/10.1098/rstb.2007.2093>
- Lang, A. (2000). The Limited Capacity Model of Mediated Message Processing. *Journal of Communication, 50*(1), 46–70. <https://doi.org/10.1111/j.1460-2466.2000.tb02833.x>
- Li, H., Edwards, S. M., & Lee, J. H. (2002). Measuring the Intrusiveness of Advertisements: Scale Development and Validation. *Journal of Advertising, 31*(2), 37–47. <https://doi.org/10.1080/00913367.2002.10673665>
- Lim, J. S., Ri, S. Y., Egan, B. D., & Biocca, F. A. (2015). The cross-platform synergies of digital video advertising: Implications for cross-media campaigns in television, Internet and mobile TV. *Computers in Human Behavior, 48*, 463–472. <https://doi.org/10.1016/j.chb.2015.02.001>
- Liu, Y., & Gu, X. (2019). Media multitasking, attention, and comprehension: a deep investigation into fragmented reading. *Educational Technology Research and Development, 68*(1), 67–87. <https://doi.org/10.1007/s11423-019-09667-2>
- MacKenzie, S. B., & Lutz, R. J. (1989). An Empirical Examination of the Structural Antecedents of Attitude toward the Ad in an Advertising Pretesting Context. *Journal of Marketing, 53*(2), 48–65. <https://doi.org/10.1177/002224298905300204>
- Mayer, R. E., & Moreno, R. (2003). Nine Ways to Reduce Cognitive Load in Multimedia Learning. *Educational Psychologist, 38*(1), 43–52. [https://doi.org/10.1207/s15326985ep3801\\_6](https://doi.org/10.1207/s15326985ep3801_6)

- Miller, C. H., Lane, L. T., Deatrick, L. M., Young, A. M., & Potts, K. A. (2007). Psychological Reactance and Promotional Health Messages: The Effects of Controlling Language, Lexical Concreteness, and the Restoration of Freedom. *Human Communication Research, 33*(2), 219–240. <https://doi.org/10.1111/j.1468-2958.2007.00297.x>
- Moyer-Gusé, E., & Nabi, R. L. (2010). Explaining the effects of narrative in an entertainment television program: Overcoming Resistance to Persuasion. *Human Communication Research, 36*(1), 26–52. <https://doi.org/10.1111/j.1468-2958.2009.01367.x>
- Ohanian, R. (1990). Construction and validation of a scale to measure celebrity endorsers' perceived expertise, trustworthiness, and attractiveness. *Journal of Advertising, 19*(3), 39–52. <https://doi.org/10.1080/00913367.1990.10673191>
- Paivio, A. (1986). *Mental Representations: a dual coding approach*. <https://ci.nii.ac.jp/ncid/BA19613767>
- Petty, R. E., Wells, G. L., & Brock, T. C. (1976). Distraction can enhance or reduce yielding to propaganda: Thought disruption versus effort justification. *Journal of Personality and Social Psychology, 34*(5), 874–884. <https://doi.org/10.1037/0022-3514.34.5.874>
- Quick, B. L., & Stephenson, M. T. (2008). Examining the Role of Trait Reactance and Sensation Seeking on Perceived Threat, State Reactance, and Reactance Restoration. *Human Communication Research, 34*(3), 448–476. <https://doi.org/10.1111/j.1468-2958.2008.00328.x>
- Richter, M. (2010). Pay attention to your manipulation checks! Reward impact on cardiac reactivity is moderated by task context. *Biological Psychology, 84*(2), 279–289. <https://doi.org/10.1016/j.biopsycho.2010.02.014>
- Rideout, V. J. (2005). When the television is always on: Heavy television exposure and young children's development. *American Behavioral Science, 48*(5), 562–577.
- Saadeghvaziri, F., Dehdashti, Z., & Reza Kheyrikhah Askarabad, M. (2013). Web advertising. *Journal of Economic and Administrative Sciences, 29*(2), 99–112. <https://doi.org/10.1108/jeas-09-2013-0029>
- Salvucci, D. D., & Taatgen, N. (2010). *The multitasking mind*.

- Segijn, C. (2019). A new mobile data driven message strategy called synced advertising: Conceptualization, implications, and future directions. *Annals of the International Communication Association*, 43(1), 58–77. <https://doi.org/10.1080/23808985.2019.1576020>
- Segijn, C. M., & Van Ooijen, I. (2020). Differences in consumer knowledge and perceptions of personalized advertising: Comparing online behavioural advertising and synced advertising. *Journal of Marketing Communications*, 28(2), 207–226. <https://doi.org/10.1080/13527266.2020.1857297>
- Segijn, C. M., & Voorveld, H. a. M. (2021). A first step in unraveling synced advertising effectiveness. *International Journal of Advertising*, 40(1), 124–143. <https://doi.org/10.1080/02650487.2020.1778279>
- Segijn, C. M., Voorveld, H. a. M., & Vakeel, K. A. (2021). The Role of Ad Sequence and Privacy Concerns in Personalized Advertising: An Eye-Tracking Study into Synced Advertising Effects. *Journal of Advertising*, 50(3), 320–329. <https://doi.org/10.1080/00913367.2020.1870586>
- Segijn, C. M., Voorveld, H. A., & Smit, E. G. (2016). The Underlying Mechanisms of Multiscreening Effects. *Journal of Advertising*, 45(4), 391–402. <https://doi.org/10.1080/00913367.2016.1172386>
- Segijn, C. M., Voorveld, H. A., & Smit, E. G. (2017). How Related Multiscreening Could Positively Affect Advertising Outcomes. *Journal of Advertising*, 46(4), 455–472. <https://doi.org/10.1080/00913367.2017.1372233>
- Slater, M. D., & Rouner, D. (2002). Entertainment-Education and Elaboration Likelihood: Understanding the Processing of Narrative Persuasion. *Communication Theory*, 12(2), 173–191. <https://doi.org/10.1111/j.1468-2885.2002.tb00265.x>
- Teigen, K. H. (1994). Yerkes-Dodson: A Law for all Seasons. *Theory & Psychology*, 4(4), 525–547. <https://doi.org/10.1177/0959354394044004>
- Van Cauwenberge, A., Schaap, G., & Van Roy, R. (2014). “TV no longer commands our full attention”: Effects of second-screen viewing and task relevance on cognitive load and

- learning from news. *Computers in Human Behavior*, 38, 100–109.  
<https://doi.org/10.1016/j.chb.2014.05.021>
- Voorhees, C. M., Fombelle, P. W., Gregoire, Y., Bone, S., Gustafsson, A., Sousa, R., & Walkowiak, T. (2017). Service encounters, experiences and the customer journey: Defining the field and a call to expand our lens. *Journal of Business Research*, 79, 269–280.  
<https://doi.org/10.1016/j.jbusres.2017.04.014>
- Voorveld, H. A. (2011). Media multitasking and the effectiveness of combining online and radio advertising. *Computers in Human Behavior*, 27(6), 2200–2206.  
<https://doi.org/10.1016/j.chb.2011.06.016>
- Voorveld, H. A. M., Neijens, P. C., & Smit, E. G. (2011). Opening the black box: Understanding crossmedia effects. *Journal of Marketing Communications*, 17(2), 69–85.  
<https://doi.org/10.1080/13527260903160460>
- Waiākea. (2022). *Waiākea*. Retrieved March 27, 2022, from <https://waiakea.com>
- Yang, J., Jiang, M., & Wu, L. (2021). Native Advertising in WeChat Official Accounts: How Do Ad-Content Congruence and Ad Skepticism Influence Advertising Value and Effectiveness? *Journal of Interactive Advertising*, 21(1), 17–33.  
<https://doi.org/10.1080/15252019.2021.1900758>
- Yoo, C. Y. (2009). Effects beyond click-through: Incidental exposure to web advertising. *Journal of Marketing Communications*, 15(4), 227–246. <https://doi.org/10.1080/13527260802176419>
- Youn, S., & Kim, S. (2019). Understanding ad avoidance on Facebook: Antecedents and outcomes of psychological reactance. *Computers in Human Behavior*, 98, 232–244.  
<https://doi.org/10.1016/j.chb.2019.04.025>
- Zhang, W., Jeong, S.-H., & Fishbein, M. (2010). Situational Factors Competing for Attention: The Interaction Effect of Multitasking and Sexually Explicit Content on TV Recognition. *Journal of Media Psychology Theories Methods and Applications*, 22(1):2-13.
- ZIGT. (2015). *Sport Expert sessie: Synced Advertising*. <http://www.zigt.nl/spot-expert-sessie-syncedadvertising/>

## Appendix

### Appendix A – Factor analysis intrusiveness end scale

	Intrusiveness		
	1	2	3
The message got in the way of what I wanted.		.680	
Interfering		.850	
Intrusive		.797	
Invasive		.549	
Pushy		.662	
Distracting		.603	
Positive/negative	.733		
Not irritating/irritating	.589		
Meaningful/pointless	.708		
Unappealing/appealing	.823		
Unattractive/Attractive	.877		
Wonderful/awful	.816		
It irritates me when an ad appears on an app I'm using.			.768
It irritates me when an ad pops up when I'm trying to watch a video online.			.872
It irritates me when an ad obstructs the screen when I'm trying to read a news article.			.846
It irritates me when an online video ad pops up with the sound on.			.689
Cronbach's Alpha $\alpha = .886$			

## Appendix B – Questionnaire

### Synced Advertising

---

#### Start of Block: INTRO

INFORMED CONSENT I have fully read through and accepted the informed consent that was sent to me prior to this experiment.

Yes

No

---

Experiment Code:

---

#### End of Block: INTRO

---

#### Start of Block: NASA-TLX

Click-Through Rate: Did you tab the "click here" button on the mobile pop-up advertisement?

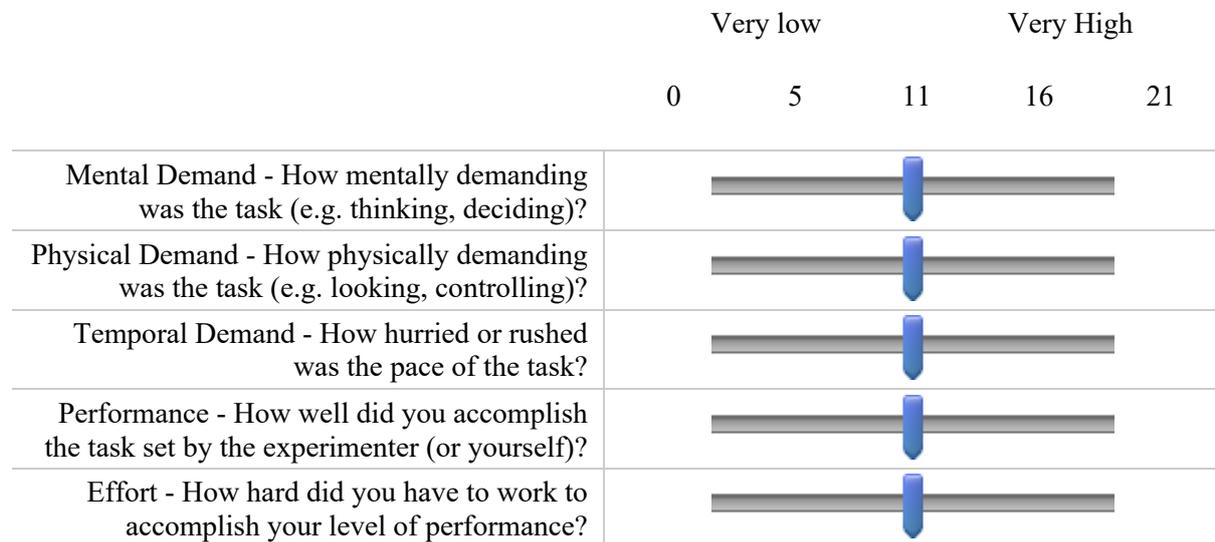
Yes

No

Not sure

---

NASA-TLX: How demanding did you find this experiment?



Purchase Intention: Would you buy the online advertised product? The following statements relate to your interest in buying the Waiākea product that was advertised on TV.

	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
I will buy the product that was advertised in the Waiākea TV advertisement.	<input type="radio"/>						
I desire to buy the product that was advertised in the Waiākea TV advertisement.	<input type="radio"/>						
I am likely to buy the product that was advertised in the Waiākea TV advertisement.	<input type="radio"/>						
I plan to purchase the product that was advertised in the Waiākea TV advertisement.	<input type="radio"/>						

**End of Block: NASA-TLX**

**Start of Block: RECOGNITION**

Page Break

Cued Recall: The following questions relate to the Waiākea TV Advertisement that you have seen. Which of the brands have you just seen in the TV Advertisement?

- Picture 1 (first picture)
  - Picture 2 (second picture)
  - Picture 3 (third picture)
  - Picture 4 (fourth picture)
  - Not sure
- 



Recognition: Which of the statements have been made in the Waiākea TV advertisement?

	True	False	Don't know
Waiākea volcanic water is the first of its kind.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our water is filtered through the purest charcoal in the deepest caves of Hawaii.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This volcanic process enhances the water with electrolytes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
For every liter you buy, Waiākea donates €10 to Doctors Without Borders.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Waiākea is making a difference, both for the environment and people in need around the world.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
So drink healthy and drink Waiākea to make the world a better place.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Ad credibility: How credible did you find the Waiākea TV advertisement?



---

Page Break

Ad attitude: The following questions relate to the mobile advertisement you have seen on your mobile phone. To what extent did you like the mobile advertisement?

	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
Overall, I liked the mobile advertisement.	<input type="radio"/>						
In general, I am favorable of the mobile advertisement.	<input type="radio"/>						
I found the mobile advertisement a good thing.	<input type="radio"/>						
The mobile advertisement was pleasant.	<input type="radio"/>						

Threat of freedom: How did the mobile advertisement behave in terms of your decisions?

	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
This ad tried to make a decision for me.	<input type="radio"/>						
This ad threatened my freedom to choose.	<input type="radio"/>						
I feel threatened when this ad got in the way of what I wanted.	<input type="radio"/>						

Psych Reactance: What is your opinion about the mobile advertisement message?

	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
The message was pleasant.	<input type="radio"/>						
The message got in the way of what I wanted.	<input type="radio"/>						
The message was reasonable.	<input type="radio"/>						
The message was fair.	<input type="radio"/>						

Page Break

Psych Reactance 2: How did the mobile advertisement make you feel?

	Not at all	Hardly	To a small extent	Neutral	To a large extent	Fairly much	Very much
Irritated	<input type="radio"/>						
Angry	<input type="radio"/>						
Annoyed	<input type="radio"/>						

Intrusiveness: I perceived the mobile advertisement as...

	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
Distracting	<input type="radio"/>						
Disturbing	<input type="radio"/>						
Forced	<input type="radio"/>						
Interfering	<input type="radio"/>						
Intrusive	<input type="radio"/>						
Invasive	<input type="radio"/>						
Pushy	<input type="radio"/>						

Ad irritation: In general, online advertising is...

	1	2	3	4	5	6	7	
Negative	<input type="radio"/>	Positive						
Irritating	<input type="radio"/>	Not irritating						
Pointless	<input type="radio"/>	Meaningful						
Unappealing	<input type="radio"/>	Appealing						
Unattractive	<input type="radio"/>	Attractive						
Awful	<input type="radio"/>	Wonderful						



Ad Irritation 2: What is your opinion about online advertising in general?

	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
It irritates me when an ad appears on an app I'm using.	<input type="radio"/>						
It irritates me when an ad pops up when I'm trying to watch a video online.	<input type="radio"/>						
It irritates me when an ad obstructs the screen when I'm trying to read a news article.	<input type="radio"/>						
It irritates me when an online video ad pops up with the sound on.	<input type="radio"/>						

Page Break

Comprehension: You are almost there! The last two questions relate to the Waiākea TV advertisement again. TV advertisement you saw contained various arguments. Please indicate to what extent you found these items understandable.

	Not at all	Hardly	To a small extent	Neutral	To a large extent	Fairly much	Very much
The water is naturally filtered through more than 14,000 ft of purest lava stones.	<input type="radio"/>						
This volcanic process enhances the water with electrolytes.	<input type="radio"/>						
Waiākea is then responsibly packaged, using 100% recycled plastic.	<input type="radio"/>						
Waiākea is making a difference, both for the environment and people in need around the world.	<input type="radio"/>						
For every liter you buy, Waiākea donates 650 liters of clean water to those without access through pump aid.	<input type="radio"/>						
Waiākea is truly unlike any other.	<input type="radio"/>						

So drink  
healthy,  
drink  
sustainably,  
drink  
ethically,  
drink  
Waiākea.



Counterarguing: How did you feel while watching the Waiākea TV advertisement?

	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
While watching the Waiākea TV advertisement, I sometimes felt like I wanted to 'argue back'.	<input type="radio"/>						
While watching the Waiākea TV advertisement, I sometimes found myself thinking of ways I disagreed with what was being presented.	<input type="radio"/>						
While watching the Waiākea TV advertisement, I could not help thinking about ways that the information being presented was inaccurate or misleading.	<input type="radio"/>						
I found myself looking for flaws in how information was presented in the Waiākea TV advertisement.	<input type="radio"/>						

**End of Block: RECOGNITION**

**Start of Block: Demographics**

Age: What is your age? (in numbers)

\_\_\_\_\_

Gender: What is your gender?

Male

Female

Prefer not to say

Other: \_\_\_\_\_

Participation: How did you participate in this experiment?

Online

On location

Preference bottled water: Do you like to drink bottled water?

Yes

No

Not sure

Brand knowledge: Have you ever heard of the brand Waiākea before?

- Yes
- No
- Not sure

Ethnicity: What is your ethnicity?

- Asian or Pacific Islander
- Black or African American
- Hispanic or Latino
- Native American or Alaskan Native
- White or Caucasian
- Multiracial or Biracial
- Other: \_\_\_\_\_

Living in: Where do you currently live?

- Netherlands
- Germany
- Belgium
- France
- Italy
- England
- Denmark
- Sweden
- Finland

- Norway
- Switzerland
- Austria
- Portugal
- Other: \_\_\_\_\_

**Appendix B:** Factor loadings final intrusiveness index

	Intrusiveness		
	1	2	3
The mesage got in the way of what I wanted.		.680	
Interfering		.850	
Intrusive		.797	
Invasive		.549	
Pushy		.662	
Distracting		.603	
Positive/negative	.733		
Not irritating/irritating	.589		
Meaningful/pointless	.708		
Unappealing/appealing	.823		
Unattractive/Attractive	.877		
Wonderful/awful	.816		
It irritates me when an ad appears on an app I'm using.			.768
It irritates me when an ad pops up when I'm trying to watch a video online.			.872
It irritates me when an ad obstructs the screen when I'm trying to read a news article.			.846
It irritates me when an online video ad pops up with the sound on.			.689
Cronbach's Alpha $\alpha = .886$			