

# **Now is the time to embrace interactive electronic applications of Association Pattern Technique**

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## **Abstract**

Over time, researchers have explored and used diverse methodologies and innovative techniques to gain a better understanding of consumer behaviour. The laddering technique, in particular, has drawn considerable interest in recent years. Scholars across various fields have produced valuable findings using the Association Pattern Technique (APT) as a hard laddering technique. Compared to soft laddering, however, its potential to uncover consumers' behavioural processes has not yet been optimised, probably due to several misconceptions. Following a systematic review of APT studies, prevailing issues are highlighted and an interactive electronic APT is proposed as a useful guideline for expanding future consumer behaviour research with actionable implications across different disciplines, including retailing.

**Keywords:** Association Pattern Technique (APT); interactive electronic research; hard laddering; means-end; systematic review

## **1. Introduction**

Apart from particular research interests, scholars and practitioners in the fields of retail and marketing are continually exploring innovative research methodologies to elicit and better understand the complex underlying forces that direct consumers' choice and behavioural processes in the marketplace. This method-based systematic review paper analyses and synthesises two decades of the use of the Association Pattern Technique (APT) and summarises researchers' accomplishments in this regard. These findings, together with concerns associated with the technique, are used to recommend ways to enhance the exciting opportunities that this research technique holds, for future research.

### **1.1 Background**

The APT is a quantitative technique for measuring means-end chains (MECs) (Ter Hofstede et al., 1998). Means-end theory originated from an interest in a particular topic of consumer behaviour, namely, personal values that motivate an individual's unique behaviour (Arsil et al., 2016; Gutman, 1982; Reynolds, 2006). The nature of personal values as an organised, hierarchical system is explained in the seminal work of Rokeach (1973), which subsequently inspired Gutman's (1982) means-end chain (MEC) theory, presenting exciting opportunities for research. MEC theory holds that consumers' product choices are based on their perceptions of the contribution of particular attributes of a specific product towards certain desirable outcomes or an end-state of existence (Gutman, 1982). Means-end research proposes that through learning, cognitive linkages are formed between specific (product) attributes (A) and the perceived consequences (C). These consequences are eventually associated with the use of the product and can boost consumers' satisfaction, and support their underlying personal values (V) (Gutman, 1982; Ha and Jang, 2013). Of particular interest for researchers is the fact that this cognitive structure (A-C-V structure) is always hierarchical and that it progresses in terms of the level of abstraction, with product attributes being the least abstract and personal values being the most abstract (Olson, 1995; Parumasur and Roberts-Lombard, 2014).

Traditionally, MEC researchers have used the so-called laddering technique in qualitative personal interviews (Kitsawad and Guinard, 2014; Veludo-de-Oliveira et al., 2006) – a technique that originated from the works of Kelly (1955) and Hinkle (1965). With this, the use of clever probing techniques in one-on-one depth interviews assists in uncovering the underlying, more abstract reasoning behind consumers' choice behaviour (Reynolds and Gutman, 1988). During data analysis, the attributes (A),

consequences (C) and personal values (V), as well as the linkages among the attributes, consequences and related values, are identified (Gengler, 1990) and summarised as paired relationships in an implication matrix (Veludo-de-Oliveira et al., 2006). Based on a completed implication matrix, a hierarchical value map (HVM), also referred to as a consumer decision map (CDM), is constructed (Phillips and Reynolds, 2009) that visually indicates the relationship among the attributes, consequences, and the values that were specified by the participants (Amatulli and Guido, 2011). Specialised MEC software, such as Laddermap and MECAnalyst Plus, can be used to analyse the data and to generate the relevant HVMs (Borgardt, 2018).

This research was particularly interested in former MEC applications in qualitative research that exposed pertinent challenges that may have discouraged researchers' application of this technique. Issues highlighted, were the labour intensiveness, cost and time required to conduct qualitative personal interviews and to transcribe, code and analyse the data meticulously (Ter Hofstede et al., 1998) as well as the scarcity of skilled interviewers required to prevent interviewer bias and to enhance the trustworthiness of studies (Malhotra et al., 2017; Veludo-de-Oliveira et al., 2006). Geographical constraints that complicate access to participants and that may cause sample bias (Phillips and Reynolds, 2009), as well as relatively small sample sizes that generally constrain the nature of qualitative research to explorative research, are frequently indicated as concerns (Vriens and Ter Hofstede, 2000). Not surprisingly, therefore, researchers became eager to produce alternative quantitative laddering techniques to collect MEC data. Grunert and Grunert (1995) were the first to distinguish between so-called "hard laddering", a quantitative laddering process that forces respondents to produce ladders in a predetermined sequence and that allows the inclusion of much larger samples, and "soft laddering" that is based on qualitative depth interviews that encourage open, natural conversation but which poses noteworthy limitations as discussed.

This paper focuses on the Association Pattern Technique (APT), a hard laddering technique aimed at accommodating the concerns and shortcomings that have been expressed by scholars interested in MEC research to date.

### ***1.2 Introduction of the Association Pattern Technique***

The APT was introduced more than 20 years ago by Ter Hofstede et al. (1998). This technique is referred to as among the "hardest of hard" laddering methods, as it uses a series of matrices to uncover

cognitive linkages (Phillips and Reynolds, 2009). Traditionally, two matrices are used. The first being the attribute–consequence matrix (AC matrix), in which the attributes associated with a specific phenomenon (e.g. “store location”) are indicated in the rows of the matrix and the consequences (e.g. “convenience”) are distinguished in the columns (Ter Hofstede et al., 1998). As a result, respondents have to indicate the specific consequence/s that they associate with each attribute, as shown in Figure 1 adapted from the APT study of Lee et al. (2014). In the subsequent consequence–value matrix (CV matrix), respondents indicate the associations between the consequences that are presented in rows and the personal values that are shown in columns (Lee et al., 2014).

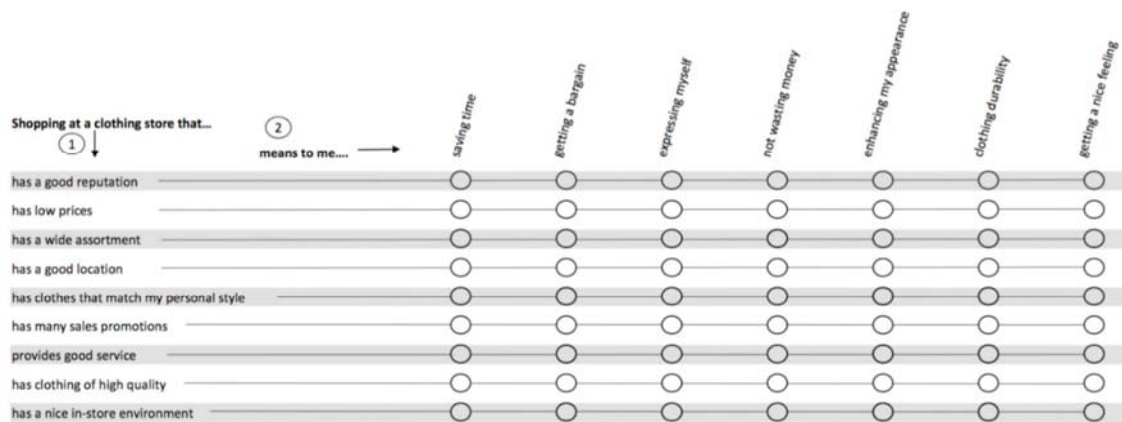


Fig. 1. AC-MATRIX example (self developed based on Lee et al. (2014)).

The attributes, consequences and personal values used in these matrices are defined a priori, either through a pre-study such as personal interviews, or specially designed focus group discussions. Vriens and Ter Hofstede (2000) recommend the use of soft laddering interviews to identify the elements for inclusion in the matrix. The relevant elements could also be identified through a review of current literature, provided that a rich theoretical base exists (Barrena et al., 2017; Choi, 2016b).

Significant advantages of the quantitative nature of the APT as a hard laddering technique when compared to soft laddering is that larger samples can be involved, interviewer bias is negated, data collection and analysis is faster and easier, while the entire process is cheaper to execute (Reynolds, 2006; Russell et al., 2004; Ter Hofstede et al., 1999). Data analysis in both MEC and APT studies are based on implication matrices, although the APT process is much quicker and more comfortable because the HVM can be generated directly from the survey questions (Horeni et al., 2010a; Phillips

and Reynolds, 2009). A noteworthy limitation of hard laddering is its inability to deal with forked answers. An attribute or consequence can therefore not be linked to more than one reason as is possible with qualitative interviews where additional "why" prompts can be used to expand participants' answers (Botschen and Thelen, 1998). Using matrices, the APT overcomes this limitation, since a respondent has the opportunity to indicate more than one association with a specific element (e.g. linking "*store location*" with "*convenience*" as well as with "*saving time*"). Consequently, the APT that allows researchers to capture forked answers is particularly advantageous in that the same outcome can be achieved with larger samples as is possible with qualitative, personal interviews in smaller samples (Russell et al., 2004).

### **1.3 Critique and limitations related to the APT**

During the past two decades, considerable criticism of the APT has come to the fore. For example, some scholars believe that hard and soft laddering techniques will not produce similar results, arguing that with hard laddering, answers may be superficial as they are not created spontaneously by respondents, which infringes one of the core assumptions of laddering (Gengler and Reynolds, 1995; Phillips and Reynolds, 2009). Contrary to soft laddering where participants are requested to recall associations from their memory, and which allows for freedom of expression (Veludo-de-Oliveira et al., 2006), hard laddering reduces cognitive effort, as respondents are merely required to recognise associations from set alternatives (Horeni et al., 2010a; Phillips and Reynolds, 2009). This is a relatively easy task for participants to complete compared to when having to respond to actual questions (Bradburn et al., 2004). Unfortunately, therefore, respondents may be less involved in the questions – not mentally contemplating the issue seriously (Phillips and Reynolds, 2009).

Another issue concerns the uniformity of the sample and respondents' exposure to a set of predetermined concepts that may not necessarily cover the scope of the topic entirely (Gengler and Reynolds, 1995). In essence, the APT presents a set number of attributes, consequences, and values as part of the MECs, which may not be a true reflection of all the concepts that are part of a respondent's cognitive structure (Reynolds, 2006). It is furthermore likely that an individual's MEC structure may skip certain levels of abstraction during an interview (Russell et al., 2004), while the APT "forces" responses on all levels (Horeni et al., 2010b).

Although MECs focus on the attribute-consequence-value (A-C-V) linkages, numerous studies propose alternative abstractions that can potentially expand to six levels, namely concrete and abstract attributes, functional and psycho-social consequences, and instrumental and terminal values (Amatulli and Guido, 2011; Reynolds, 2006). The seminal work of Ter Hofstede et al. (1998) attends to this concern, explaining that the APT can accommodate supplementary levels by incorporating additional matrices. The biggest concern, however, relates to the consequence level: in most cases, one consequence is first linked to another consequence, before it is linked to the underlying personal value, which implies a consequence–consequence association (Klenosky, 2002; Reynolds, 2006). The network of concepts for an APT study that presents a three-level hierarchy, may therefore not be as complicated as that of a qualitative study with a six-level hierarchy (Valli et al., 2000).

In an attempt to enhance the potential of APT studies for future application, a thorough systematic review of APT studies was done to assimilate scholars' recommendations for optimising this technique.

## **2. Methodology**

This systematic review followed the six-step approach of Littell et al. (2008), as outlined by Palmatier et al. (2018), employing a systematic, method-based procedure to review, synthesise and extend the existing body of literature on APT hard laddering (Palmatier et al., 2018). A primary consideration was that the methodology should be transparent and reproducible (Hanley and Cutts, 2013; Palmatier et al., 2018).

### **2.1 Data collection and analysis**

Following the recommendations of Ter Hofstede et al. (1998), a systematic review of studies that had employed the APT over 21 years was conducted to highlight best practices and to determine how the technique could be enhanced for future application. Two main objectives with sub-objectives guided the review.

Objective 1 focused on methodological aspects as applied in previous APT studies:

Objective 1.1: To analyse the number of matrices captured.

Objective 1.2: To assess the number of attributes, consequences, and values captured in the matrices.

Objective 1.3: To review the retrieval of the attributes, consequences, and values presented in the matrices.

Objective 1.4: To assess the sample sizes.

Objective 2 aimed to provide a comprehensive overview of how APT could expand future research, specifically:

Objective 2.1: To indicate possible applications of the APT across different disciplines.

Objective 2.2: To make suggestions for future research in terms of the research context (country) and product category.

Only APT studies were included, based on specific criteria that represent the fundamentals of the APT, hence excluding APT-inspired studies. For example, the inclusion of empty matrices whereby respondents have the opportunity to spontaneously provide the attributes, consequences, and values, were excluded as they present a different hard laddering technique that is referred to as “thought listings” (Botschen and Thelen, 1998). The inclusion criteria for journal articles that were considered in this overview, were the following:

- Both means (attributes) and ends (personal values) should have formed part of data collection and analysis to allow means-end chains to be uncovered.
- Matrices should have been used to uncover association linkages.
- The matrices should have contained a priori defined attributes, consequences, and values.

During the sampling procedure, all potentially relevant articles were identified. As Elsevier's Scopus is considered the largest citation database of peer-reviewed literature, it was used to retrieve all potentially relevant, published APT studies. The search commenced with all the articles that, up to 12 March 2019, had cited the seminal APT article of Ter Hofstede et al. (1998). This resulted in the retrieval of a total of 131 peer-reviewed academic works that were then exported into Microsoft Excel. This revealed three duplications and six books, thus excluding nine sources. Of the 122 remaining citations, 119 were available online. Hard copies of the remaining three articles were accessed through inter-library loans.

A text review of the methodology sections of the selected articles was conducted following the set criteria indicated above, to establish whether an article represented a true APT study or not. In nine of

the 122 selected articles, the APT either served as inspiration for the researchers' measuring instrument or inspired their methodological approach, for example, the studies of Dellaert et al. (2017), Chen et al. (2015), Fu and Wu (2013) and Chiu (2005). Many authors cited Ter Hofstede et al. (1998) as the theoretical underpinning for their work (Bieberstein and Roosen, 2015; Ho and MacDorman, 2017), while some merely cited this seminal work to acknowledge the APT as a hard laddering technique (Mesquita, 2010; Sun et al., 2009). Eventually, only 34 of the 122 selected articles met all the stipulated criteria and were considered worthy for inclusion in the review and as exemplary of how to use the APT as a measuring instrument.

A rigorous full-text review of all 34 APT articles was conducted, guided by a predetermined protocol that specified the nature of the information that had to be extracted from each article to accomplish the objectives of the systematic review. A Microsoft Excel spreadsheet, that was structured according to the protocol, was completed during the review process. Authors were contacted via e-mail to request them to expand whenever specific information was not indicated in the article itself. Unfortunately, not all of them responded and therefore the final spreadsheet lacked some information.

## **2.2 Results**

Table 1 provides a chronological summary of the results of the literature review. Five of the studies were reported in more than one article, in which case the first publication was listed, indicating the others with an asterisk.

### **2.2.1. Objective 1: Methodological aspects**

Objective 1.1 relates to the number of matrices contained in previous APT studies. Table 1 shows that only the studies of Schauerte (2009) and Kwon et al. (2015) included an additional matrix to the two matrices that are generally included in APT studies. Both of these studies presented the additional matrix as a consequence–consequence matrix (CC matrix) after the AC matrix but before the CV matrix, which presents a solution for previous critique concerning a lack of consequence–consequence linkages.

Objective 1.2 concerns another debate among researchers concerning the number of columns and rows that should be included in the matrices. Usually, the APT included two matrices, the first being the AC matrix, and the second presenting the CV matrix. For these matrices to be constructed, researchers



**TABLE 1: SUMMARY OF APT STUDIES**

Year	Author	Levels	A-C-V	Origin of attributes and consequences	Values	Sample size	Application	Country	Product category
		<i>Objective 1.1</i>	<i>Objective 1.2</i>	<i>Objective 1.3</i>	<i>Objective 1.3</i>	<i>Objective 1.4</i>	<i>Objective 2.1</i>	<i>Objective 2.2</i>	<i>Objective 2.2</i>
1998	Ter Hofstede, Audenaert, Steenkamp & Wedel	3 levels	12-?-?	Prior research & 100 depth interviews	Self-elicited	100	Introduced the APT technique. Tested assumptions	Belgium	Food
1999	Ter Hofstede, Steenkamp & Wedel	3 levels	8-10-9	100 depth interviews	LOV Kahle	2961	Market segmentation Positioning	11 Countries of the EU	Food
2000	Zins	3 levels	18-10-9	Focus groups (2 rounds), (Also used from own previous research & literature)	LOV Kahle	137	NA: Study focussed on comparison of techniques	Austria	Tourism
2001	Feunekes & den Hoed	3 levels	Unknown	Unknown	Unknown	Unknown	Product development	Netherlands & China	Food
2001	Grunert & Valli	3 levels	Y:8-10-9 B:9-9-9	100 depth interviews (each)	LOV Kahle	Yogurt : 2961 Beef: 3241	Market segmentation Product development	11 Countries of the EU	Food
2001	Vanoppen, Verbeke & Van Huylenbroeck	3 levels	13-23-19	Previous research	Previous research	14	Motivational structures Marketing communication	Belgium	Food
2004	Mort & Rose	3 levels	5-5-5	Prior research	Previous studies	191	NA: Study focussed on comparison of utilitarian & hedonic products	Australia	Variety
2007	Langbroek & Beuckelaer	3 levels	10-12-7	Prior research (literature)	Oppenhuisen -Dutch personal values	80	NA: Study focussed on validity	Netherlands	Food
2008	Alonso & Marchetti	3 levels	12-14-9	9 depth interviews	LOV Kahle	240	Market segmentation	Brazil	Luxury market
2009	Schauerte	4 levels	10-12-8	Personal interviews (31 Germany; 34 Sweden)	Self-elicited	732	Marketing strategies	Germany & Sweden	Architecture
2009a	Barrena & Sanchez	3 levels	14-21-9	Prior research (literature) + consultation with experts through a pilot survey	LOV Kahle	62	Marketing strategies Market segmentation	Spain	Food
2009b	Barrena & Sanchez	3 levels	11-21-9	Prior research (literature) + consultation with experts through a pilot survey	LOV Kahle	70	Marketing strategies Market segmentation	Spain	Food
2010a	Barrena & Sanchez	3 levels	9-14-9	Prior research (literature) + consultation with experts through a pilot survey	LOV Kahle	62	Risk perception	Spain	Food
2010b	Barrena & Sanchez	3 levels	13-23-9	Prior research (literature) + consultation with experts through a pilot survey	LOV Kahle	60	N/A: Link between household structure and cognitive structures	Spain	Food
2011	Orsingher, Marzocchi & Valentini	3 levels	12-11-6	Pilot study 54 respondents alternative hard laddering with open matrices	Self-elicited	200	Customer satisfaction Market segmentation	Italy	Tourism
2011 *2012 *2013	Lopez-Mosquera & Sanchez	3 levels	8-8-9	Prior research (literature) + consultation with experts through a pilot survey	LOV Kahle	110	Market segmentation Marketing communication	Spain	Tourism
2012a	Barrena & Sanchez	3 levels	R:18-19-9 W:11-21-9 F:13-23-9	Prior research (literature) + consultation with experts through a pilot survey	LOV Kahle	70	Marketing communication Positioning	Spain	Food

Year	Author	Levels	A-C-V	Origin of attributes and consequences	Values	Sample size	Application	Country	Product category
		<i>Objective 1.1</i>	<i>Objective 1.2</i>	<i>Objective 1.3</i>	<i>Objective 1.3</i>	<i>Objective 1.4</i>	<i>Objective 2.1</i>	<i>Objective 2.2</i>	<i>Objective 2.2</i>
2012b	Barrena & Sanchez	3 levels	Cou:10-14-9 Cof: 11-17-9	Prior research (literature) + consultation with experts through a pilot survey	LOV Kahle	Couscous: 167 Coffee: 116	Marketing strategies	Spain	Food
2012	Hsiao, Yen & Li	3 levels	10-9-4	30 laddering interviews	Self-elicited (NOT personal values)	314	Customer satisfaction Customer loyalty	Taiwan	Retail
2012	Weissnar & du Rand								
*2017	Kirsten, Vermeulen, van Zyl, du Rand, du Plessis & Weissnar	3 levels	11-11-8	Focus groups	Self-elicited	276	Positioning Branding: COO	South Africa	Food
2013	Barrena & Sanchez	3 levels	9-11-9	Prior research (literature) + consultation with experts through a pilot survey	LOV Kahle	56	Marketing strategies	Spain	Food
2013	Barrena & Garcia-Lopez-de-Meneses	3 levels	13-21-9 (20 vs 21)	Prior research (literature) + consultation with experts through a pilot survey	LOV Kahle	98	Product development Positioning	Spain	Food
*2015	Barrena, Garcia & Camarena								
2013	Kang, Kang, Yoon & Kim	3 levels	13-14-11	Prior research (literature)	Previous studies	112	Market segmentation	Korea	Technology
2014	Lee, Lusk, Miroso & Oey	3 levels	10-7-10	Focus groups	Schwartz	500	Marketing mix	China	Food
2014	Cha, Kweon, Choi, Won & Kim	Unknown	Unknown	Prior research (literature) + depth interviews + professional evaluation	Unknown	487	Marketing strategies	Korea	Social Media
2015	Barrena, Garcia & Sanchez	3 levels	10-13-9	Prior research (literature) + consultation with experts through a pilot survey	LOV Kahle	167	Marketing strategies Cross-cultural globalisation	Spain	Food
2015	Kwon, Cha & Lee	4 levels	10-10-12-12 each	Prior research (literature)	Self-elicited	424	Relationship between levels of involvement and cognitive structures	Korea	Technology
2016	Escobar & Gil	3 levels	14-10-6	5 depth interviews	Self-elicited	15	Marketing strategies	Spain	Food
2016b									
*2016a	Choi	3 levels	10-10-10	Personal interviews (10 Paris; 34 South Korea)	LOV Kahle + Benevolence van Schwartz	France=157 & South Korea=171 France=161 & South Korea=179	Cross-cultural analysis of cognitive structures & decision-making process	France & South Korea	Food
2016	Hastreiter & Marchetti	3 levels	9-9-8	14 depth interviews	Self-elicited	703	Gender differences: motivational structures	Brazil	Retail
2016	Moghimi, Jusan, Izadpanahi & Mahdinejad	3 levels	10-13-7	15 depth interviews	Schwartz	124	Product development	Iran	Architecture
*2017	Moghimi, Jusan & Izadpanahi								
2017	Barrena, Garcia & Sanchez	3 levels	P:13-23-9 H:12-22-9	Prior research (literature) + consultation with experts through a pilot survey	LOV Kahle	70	Market segmentation	Spain	Food
2018	Lee & Choi	Unknown	Unknown	Prior research (literature)	Unknown	300	Unknown	Korea	Sport
2019	Kim & Kim	3 levels	12-12-6	Prior research (literature)	Previous studies	102	Marketing strategies	Italy	Tourism

first had to identify the most critical attributes (A), consequences (C) and values (V) that related to their specific study (Ter Hofstede et al., 1998). As indicated in Table 1, these are presented as A-C-V. Some of the studies have included fewer items in their matrices, for instance, the study of Mort and Rose (2004) that only included five attributes, five consequences, and five values, which is typically referred to as a 5-5-5 scenario. In contrast, others have included almost three times as many items, for instance Barrena and Sánchez (2012a), who included 18 attributes, 19 consequences and nine values (18-19-9) in their study. It is important to note beforehand that fewer items in the matrices will limit the number of cognitive chains that can potentially be elicited, hence the subsequent cognitive structure that is produced will be more straightforward (Valli et al., 2000). Although the APT enables researchers to uncover more complex cognitive structures by including more items, too many items in the matrices may result in respondent bias as it will complicate respondents' task to indicate associations. Researchers therefore have to contemplate the number of items to be included in their study very cautiously, and rather do a pre-test before they embark on the larger investigation.

Objective 1.3 addresses the controversial issue of how the attributes, consequences and personal values should be retrieved to structure the matrices. While some researchers retrieved these from existing literature (Kang et al., 2013; Kim and Kim, 2019; Mort and Rose, 2004; Vannoppen et al., 2001), other APT studies were based on preceding qualitative studies, mostly depth interviews using soft laddering (Escobar and Gil, 2016; Hastreiter and Marchetti, 2016; Hsiao et al., 2012; Ter Hofstede et al., 1999). Generally speaking, however, it is usually not easy for consumers (participants) to express deep-rooted underlying personal values verbally. It may, for example, be awkward to admit that self-enhancement drives one's preference for certain product attributes, such as certain brand names, or to admit to certain desired consequences, such as to make a good impression. Nonetheless, some scholars preferred to elicit their own value dimensions through depth interviews (Orsingher et al. (2011)). Alternatively, most APT studies have incorporated existing value typologies in their CV matrices, arguing that values are to a certain extent universal and that by doing so, it will provide greater empirical support for the outcomes of the study (Moghimi et al., 2018; Vriens and Ter Hofstede, 2000). Some scholars have, for example, used the List of Values (LOV) of Kahle et al. (1986) (Alonso and Marchetti, 2008; Barrena et al., 2017; Ter Hofstede et al., 1999; Zins, 2000), while others (Lee et al., 2014; Moghimi et al., 2017) have opted for Schwartz's ten basic human values (Schwartz, 2012; Schwartz

and Boehnke, 2004). Researchers are therefore advised to contemplate and decide beforehand which value typology will be most relevant to their investigation.

Objective 1.4 attends to the sample size of APT studies. Generally, the reported sample sizes in traditional MEC studies are relatively small, owing to the qualitative nature of these studies. This inspired Ter Hofstede et al. (1998) to develop the APT for the involvement of larger samples. Their subsequent study (Ter Hofstede et al., 1999), which involved 2961 respondents, was a signal for scholars that they could proceed with larger samples (for example, Lee et al., 2014: 500 respondents; Hastreiter and Marchetti, 2016: 703 respondents; Schauerte, 2009: 732 respondents). Amid evidence that the APT can be implemented very successfully with larger samples, it is a pity and it remains uncertain why so many scholars have nevertheless continued to restrict the sample size in their APT studies; some have involved even less than 20 respondents (Escobar and Gil, 2016; Vannoppen et al., 2001). In our opinion it is important that researchers acquaint themselves with the potential of APT studies to involve larger samples.

### ***Objective 2: Research gaps and possibilities***

The specific data gathering techniques chosen by researchers eventually determine what they can accomplish with the data (Objective 2.1). To this effect, Vriens and Ter Hofstede (2000) highlighted the marketing implications of APT, explaining its potential as a tool that could direct new product development, brand assessment and brand positioning, advertising strategy development as well as market segmentation. More recently, APT studies have been useful in the design of new marketing strategies (Escobar and Gil, 2016), market segmentation (Kang et al., 2013; Lopez-Mosquera and Sanchez, 2012; López-Mosquera and Sánchez, 2013), product development (Moghimi et al., 2017), product/ brand positioning (Barrena et al., 2015a), and even in the design of an entire marketing mix (Lee et al., 2014). Opportunities for researchers to explore the use of the APT in other domains are limitless. It might, for example, be worthwhile to consider using the APT in studies concerning the banking sector, where clients could be prompted to disclose their preferences for specific services and to indicate why. Similar opportunities exist in housing, where residents could be prompted to identify desirable design features. Consumers could also indicate the preferred characteristics of a medical scheme or a vacation destination in this way. APT studies can therefore be applied very successfully in almost any discipline. With APT studies, that have the exceptional advantage that it simultaneously

provides answers to both the “what” and the “why”, there is almost no limit as to the topic that can be explored.

Objective 2.2 concerns the issue that many possibilities exist for the application of APT research in diverse product categories, notwithstanding the destination (Olson, 1995). It is not clear why APT studies have thus far mainly attracted the attention of business schools and scholars in Europe. The summary of completed research in Table 1 indicates that most of the studies were conducted in eleven European countries, namely Belgium, Denmark, France, Germany, Great Britain, Greece, Ireland, Italy, the Netherlands, Portugal, and Spain (Barrena and Sánchez, 2009b; Grunert and Valli, 2001; Ter Hofstede et al., 1999). Some evidence exists of APT studies that were performed in Asia (Cha et al., 2014; Hsiao et al., 2012; Lee and Choi, 2018), and South America (Alonso and Marchetti, 2008; Hastreiter and Marchetti, 2016), with evidence of a single study that was conducted in Africa (Weissnar and Du Rand, 2012), and in Australia (Mort and Rose, 2004) respectively. Surprisingly, evidence of APT studies conducted in North America, specifically the USA and Canada are lacking, which indicates contextual gaps that researchers could pursue. Moreover, most of the studies reported (21 out of 34) are food-related, although some researchers have ventured into other domains, such as tourism (Kim and Kim, 2019; Zins, 2000), retail (Hastreiter and Marchetti, 2016; Hsiao et al., 2012), architecture (Moghimi et al., 2016; Schauerte, 2009), technology (Kang et al., 2013; Kwon et al., 2015) and sport (Lee and Choi, 2018). Despite limited evidence, the nature and context of previous studies, therefore, indicate that scholars have ample opportunity to expand scientific research in terms of the opportunities that APT as a research technique, and as an enabling rather than a restrictive option, provides.

### ***2.3 Discussion of the findings***

This overview hopes to address misunderstandings about APT that may have jeopardised its application to date, such as its usefulness across different disciplines and product categories, as well as the issue of sample sizes, to encourage its application in future research. With the emergence of the digital era and concepts such as “the global consumer” (Cleveland and Bartsch, 2018), researchers are bound to critically evaluate the way forward in terms of how respondents can be reached and how to capture the data they require. Based on the insights gained through this overview, the authors wish to introduce and promote electronic, interactive APT studies. A comprehensive analysis of the strengths and weaknesses of APT as a hard laddering technique revealed some solutions for scholars’ concerns.

For example, Phillips and Reynolds (2009) admitted that with new technological developments, it might be possible to address the disadvantages of the APT adequately. As early as 1990, Gengler had already included an "interactive computer program to assess strengths of associations between concepts". Accordingly, it is suggested that APT surveys could be distributed electronically by using marketing research software, such as Qualtrics, that can host the electronic survey online. Two decades after the introduction of the APT in research, the digital revolution now provides researchers with the opportunity to benefit from advanced technology that is in line with the latest trends. Even though it may still be possible to execute a paper-driven exercise, the electronic version provides opportunity for interactive investigations where respondents are prompted for further responses based on their unique answers in the preceding question. This is not possible with a paper based questionnaire. Researchers have to accept that in future, respondents might be discouraged from cooperating unless techniques relate to what they regard as "order of the day". Several researchers have already successfully converted APT questionnaires for electronic distribution (Dellaert et al., 2017; Horeni et al., 2010b, 2014). Electronic distribution has many advantages, including the fact that electronic distribution is more convenient, cheaper to distribute across a broader spectrum, and faster than pencil-and-paper methods (Malhotra et al., 2017; Russell et al., 2004), and through validation options, it is possible to build logic into the questionnaire (Babin and Zikmund, 2015; Berndt et al., 2011). The data is also captured immediately while the survey progresses, after which it can easily be imported into the data analysing software (Malhotra et al., 2017).

In addition to the additional sections such as the socio-demographic questions, it is recommended that the interactive APT be framed by the following four steps:

Step 1: According to the adapted electronic APT survey of Dellaert et al. (2017), the questionnaire should firstly clearly introduce a list of a priori attributes related to the study at hand, and provide instructions for respondents to indicate the essential attributes. This step resembles the first step that is used in soft laddering interviews to elicit attributes. The compilation of the list of attributes to be included is critical (Kang et al., 2013) and researchers should contemplate the number of attributes that are included in the initial list with caution. From the start, an option "none of the above" should be added to avert former critique (Reynolds, 2006), namely that respondents were forced to choose attributes that were of no concern to them. The questionnaire should also be programmed to avoid ambiguous answers, for example, when respondents select the "none of the above" option, all the listed attributes

should become inactive, in which case the survey is terminated. It will then not be possible to generate matrices, which emphasises how important it is to ensure that the initial list of attributes is relevant and comprehensive enough to also support face validity.

Step 2: The automatically generated AC matrix that follows, indicates the attributes in rows and presents the a priori defined consequences in columns. This matrix is customised for every respondent following the attributes that were chosen by the individual in Step 1. Therefore, the number of rows, as well as the selection of rows are unique to each respondent. The columns (consequences), however, will be the same for all. At this point, researchers should remember to add a column labeled "none of these" on the far right-hand side, as was done during Step 1. This addresses concerns that respondents might be forced to make certain linkages (Reynolds (2006). The additional column hence accommodates respondents whose cognitive linkages might differ from those that are provided. Similar to the paper-and-pencil APT, the electronic version allows a respondent to indicate more than one cognitive link or association with each attribute, which produces so-called "forked" questions. When the option "none of the above" is chosen, all the other options for a specific row should be deactivated.

Step 3: Similar to the study of Schauerte (2009), and as recommended in the seminal article of Ter Hofstede et al. (1998), the subsequent step entails a CC matrix. As in Step 2, the CC matrix is customised for each respondent according to the individual's responses to the previous question (AC matrix). Therefore, a respondent's answer will only ladder from consequences that are important to the individual, reducing the risk of superficial responses as cautioned by Phillips and Reynolds (2009). Although the rows as well as the columns will, this time around, consist of consequences, the procedure is similar to the AC matrix. That means that only the rows need to be customised according to the consequences with associations, as were indicated in the AC matrix. The columns will again consist of all the a priori defined consequences, corresponding with the columns in the AC matrix and the "none of these" column. It is crucial to deactivate any matching associations in this matrix. For instance, it should not be possible for someone to link the consequence "saving time" that is listed in the rows with "saving time" that is indicated in a column. Respondents may perceive this CC-matrix as trivial, but numerous studies (Klenosky, 2002; Reynolds, 2006; Thompson and Chen, 1998) have shown that, before a consequence is linked to a value, it should be linked to another consequence, as in the example of the fictional interview presented earlier in this article. Hsiao et al. (2012) specifically indicated it as a shortcoming that they could not assess intra-level CC linkages in their APT study that consisted of only

two matrices. Inclusion of a CC matrix, therefore, negates the critique against a three-level hierarchical structure.

Step 4: To generate the rows in the subsequent step, a CV matrix is customised following the responses provided in the AC matrix as well as the CC matrix, unlike these being customised according to preceding questions only. If an association with a specific consequence is made, irrespective of which matrix the association occurred with, or the number of times that it occurred, it will be incorporated in the CV matrix. Following evidence gained from previous research, researchers could include constructs related to an established value typology as point of reference in the value column, together with a "none of these" column. Table 1 indicates that 16 out of the 34 listed studies were based on the LOV, although Schwartz's typology had also been used.

Missing data is a typical concern with paper-and-pencil APT studies whereby many responses then have to be discarded (Feunekes and Den Hoed, 2001). With the electronic APT, this issue can be resolved by the inclusion of force completion validation in every row of each matrix. This will prevent respondents from progressing to the next question prematurely.

Particularly important, is that researchers should be very cautious when deciding on the number of attributes, consequences, and values to be included in the matrices. Being an electronic exercise, many respondents might want to complete an APT questionnaire on their mobile phones or tablets that have smaller screens. Inevitably, this will complicate completion if matrices have too many rows and columns so that respondents would have to continuously scroll left and right or up and down to complete the questionnaire. This might cause confusion, irritation and lead to incorrect answers. It might also increase the likelihood that respondents would drop out of the investigation.

### **3. Conclusion**

This paper presented a systematic review of previous APT studies, aiming to address pertinent issues that have, to date, jeopardised scholars' use of this technique. Specific methodological aspects that may have caused concern were addressed in Objective 1. Objective 1.1 specifically concluded that, although most of the true APT studies were based on the inclusion of three matrices, an additional matrix, specifically a CC matrix, will enhance the richness of the data that is collected (Kwon et al., 2015; Schauerte, 2009) and will enable the elicitation of more elaborate cognitive structures. However,



there is still a lack of consensus concerning the number of attributes, consequences, and values that should or can be included in the APT matrices (Objective 1.2). Noteworthy, however, is that more is not necessarily better, as many respondents would want to complete the research on their mobile phones or tablets, which complicates the completion of very intricate matrices. Researchers will, therefore, have to contemplate the content that they wish to include beforehand very cautiously, which emphasises the importance of a thorough review of recent, relevant literature. Evidence presented in Table 1 indicates some degree of consensus concerning the number of values to be specified in the CV matrix, particularly those based on the LOV of (Kahle et al., 1986), which specifies nine values. The value typology chosen will, therefore, be the deciding factor. Concerning the retrieval of information (Objective 1.3), most studies relied on existing literature to generate related attributes and consequences, that encouraged a single-phase study where all issues concerning qualitative investigations which may be time consuming and which are based on smaller samples, are negated. Researchers concur that investigations should depart from a specific value typology for the CV matrix, although the choice of the specific value typology remains the prerogative of the researchers. Objective 1.4 attended to the notion that the reputation of the APT has to date suffered from scholars' concerns about relatively small sample sizes in former research (Grunert and Valli, 2001; Ter Hofstede et al., 1999). Unfortunately, most of the APT studies that have been reported to date, have involved less than 100 respondents (Barrena and Garcia-Lopez-de-Meneses, 2013; Barrena and Sánchez, 2012a; Langbroek and De Beuckelaer, 2007; Vannoppen et al., 2001). It is therefore very important to refer to the study of Ter Hofstede et al. (1998), who were the first to involve nearly 3000 respondents, and others who subsequently recruited more than 500 respondents for their APT investigations (Hastreiter and Marchetti, 2016; Lee et al., 2014; Schauerte, 2009). It remains uncertain why scholars have to date not yet progressed beyond this issue to pursue this technique for larger investigations. It is therefore important that researchers acquaint themselves with the potential of APT studies.

The possibilities of the APT were investigated (Objective 2) amid indications that this technique has to date not yet attracted the attention it deserves. (Objective 2.1). Opportunities in other disciplines are still under-explored and the perception may exist that this technique is more suitable for marketing-related investigations. Multiple opportunities in diverse disciplines are indicated, including health-, housing-, design-, hospitality-, and services-related studies to encourage scholars to pursue the application of the APT in the foreseeable future. It is uncertain why the application of the APT has to

date been confined to certain parts of the world, mostly Europe (Objective 2.2), with limited evidence of application in Asia, Africa, and Australia. Surprisingly, no American APT studies could be found. Also, APT studies have to date mostly been mainly food-related, which may have influenced researchers' perception of possible applications. In the end, MEC research, especially the APT, is ideally suited to uncover the underlying reasons why consumers make certain choices (Gutman, 1982; Ter Hofstede et al., 1998), irrespective of the product category. It was never meant to be product- or discipline-specific and deserves consideration across disciplines and product categories to expand literature globally across disciplinary boundaries.

In conclusion, an interactive electronic method for the application of the APT is proposed, attending to concerns that may have hindered scholars' use of this powerful technique in the past. Arguing that researchers will have to stay abreast of new trends that will characterise the reality of a digital era, it is proposed that researchers prepare to rather apply the APT in an electronic format as it simultaneously reduces problems such as time to capture data, and missing data, while possibly enticing respondents more so than the traditional survey methods. A major advantage of the electronic APT is that it enables an interactive exploration of consumers' underlying values while not being limited to sample size. Contrary to what is possible with paper-and-pencil surveys, the matrices can then be derived from prompts that are customised for every respondent, based on personal responses.

#### **4. Limitations**

This review does not claim to include every APT study that exists although the authors believe that it includes most of the APT studies to date. The systematic review mainly focused on methodological aspects, highlighting possibilities for application and describing gaps that researchers could further explore. Different data analysis methods, HVM drafting methods and validity checks did not form part of this review and will be reported on in a subsequent systematic review.

However, the proposed interactive electronic APT with built-in logic is not without limitations. Still, the APT do not allow the indication of a direct link between an attribute and a value without including a link to a consequence, and therefore it prevents the skipping of levels. Also, respondents are requested to recognise associations rather than to spontaneously recall them, which may pose problems if researchers have not managed to capture all the possible options in the grids. Unfortunately, as indicated by Hastreiter and Marchetti (2016), internet-based surveys limit the sample of respondents to

those with internet access. Another possible limitation of the proposed APT methodology might be that the inclusion of a third matrix could result in respondent fatigue and boredom. This possibility was also mentioned in the APT study of Langbroek and De Beuckelaer (2007). Another cautionary measure is to include some indication on the screen as to how far a participant has progressed with the exercise. It might be discouraging to move from one screen to the next without any idea of how many are still to come. However, using the recommendations of this study as a point of departure, solutions might develop over time if other scholars start using the technique and join the conversation. It is firmly believed that the APT, specifically in an interactive electronic format, is a useful research tool that has definite merit.

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