Tourists’ Mental Representations of Complex Travel Decision Problems

Benedict G.C. Dellaert¹, Theo A. Arentze², and Oliver Horeni²

Abstract
Tourism research has long recognized the complexity of many decisions that tourists make and proposed models to describe and analyze tourist decision processes. This article complements this previous research by proposing a view that moves away from the process of making a decision and instead investigates how tourists mentally represent the decision problem. Mental representations of travel decision problems allow tourists to evaluate the decision utility of the different available alternatives before they are chosen. We discuss the modeling and measurement of tourists’ mental representations of complex travel decision problems and provide directions for future research that focuses on the dynamics of tourist mental representations both within a single travel decision framework and over the tourist travel life cycle.

Keywords
tourist decisions, mental representations of decision problems, dynamics in tourist decision making

Introduction
Many decisions that tourists make are inherently complex. Tourists are typically faced with very many different alternatives that they can choose from (e.g., destinations, hotels, transportation options). The alternatives also often cannot be evaluated in isolation because their attractiveness may differ depending on how they are combined. For example, tourist activities (e.g., shopping or cultural activities) may be more or less attractive depending on the destination at which they are undertaken, the time at which they are undertaken, and how they are combined (e.g., Dellaert, Borgers, and Timmermans 1995; Kemperman et al. 2000), and combining multiple travel components (e.g., destinations, transportation, and accommodation) in a single trip can make trips more attractive as well as reduce costs and travel time for tourists (Chalip and McGuirty 2004; Dellaert, Borgers, and Timmermans 1997; Lue, Crompton, and Fesenmaier 1993; Lue, Crompton, and Stewart 1996; Hwang, Gretzel, and Fesenmaier 2006). Complexity can also be high because tourists have only limited information about the alternatives that they choose from (e.g., destinations or hotels that they haven’t visited before). Tourism researchers have long recognized the complexity in tourist decision making and proposed conceptual models to describe and analyze the different steps that tourists go through when making complex decisions (e.g., Choi et al. 2012; Crompton 1992; Decrop 2010; Decrop and Snelders 2004; Dellaert, Ettema, and Lindh 1998; Fesenmaier and Jeng 2000; Jeng and Fesenmaier 2002; Nicolau and Más 2005; Woodside and Lysonski 1989).

In this article, we build on our recent research on mental representations of complex decision problems (Arentze, Dellaert, and Chorus 2013; Arentze, Dellaert, and Timmermans 2008; Dellaert, Arentze, and Timmermans 2008; Dellaert et al. 2013; Horeni 2012) to propose a complementary approach to study tourist decision making. This approach focuses less on the outcomes of the specific choices that tourists make but instead addresses how tourists mentally represent the complex decision problems that they face before making a choice. Mental representations of decision problems constitute a cognitive “sandbox” that offers a basis for evaluating choices before they are made. Depending on the mental representation, different components may or may not enter into the tourist’s decision trade-offs. For example, tourists may or may not take into account public transportation services at their destination, or they may or may not think about the quality of the nearby restaurants when evaluating a certain hotel.

We introduce this approach because individuals’ mental representations of a decision problem and the choice outcomes that they select are interconnected. This connection has so far received only little attention in the literature, but is
important because it provides insights into how tourists evaluate the consequences of their decisions before these decisions are executed. In particular, modeling tourists’ decision outcomes alone may lead to only a partial understanding of how tourists make decisions. This is illustrated by the fact that when a certain potentially important aspect of a decision (e.g., travel time or risk of natural hazards) is not activated in the tourists’ mental representation of a decision problem, this aspect cannot affect the tourist’s decision outcome to begin with. A better understanding of tourists’ mental representations of decision problems may for instance provide valuable clues to tourism policy makers and tourism managers on how best to assist tourists in their decision making (e.g., by designing online environments that match tourists’ mental representations) or how to align tourism communication campaigns with tourists’ underlying mental representations of a travel decision problem.

Tourists’ Mental Representations of Complex Travel Decision Problems

Components of Mental Representations

We propose that when tourists are faced with a decision problem, such as selecting a summer holiday, they will automatically construct a mental representation of the decision alternatives and decision context that they encounter. By using this mental representation, tourists are able to evaluate the likely outcomes of their choices and therefore to oversee the potential consequences of the different choice alternatives. However, because of the limited capacity of the human working memory, tourists (like all individuals confronted with complex decision problems) experience limitations to the extent and level of detail of the decision problem that can be represented in their mind (Anderson 1983). Consequently, tourists’ mental representations will involve a significant simplification of reality and to be tailored to represent only the most important components of the specific decision task and contextual setting that they face (Johnson-Laird and Byrne 1991; Johnson-Laird 2001).

Mental representations may consist of many different components, and for decision problems they typically involve attributes and benefits, situational variables, and the causal relations between them (Arentze, Dellaert, and Timmermans 2008). Attributes and situational variables are more operational in nature and relate to physically observable states of the considered choice alternatives and the tourist environment (e.g., climate or weather). One can think of attributes as instrumental components and of situational variables as contextual components in the mental representation because the former serve as instruments to attain different outcomes in the choice while the latter cannot be influenced by the tourist’s choices and represent the context within which the choices are made (Kusumastuti et al. 2011). Thus, in terms of the causal links in the mental representation, this implies that there must be causal relations between the decision and attribute variables, but not between the decision and situational variables. Benefits, finally, tend to be more abstract in nature than attributes and describe the outcomes of tourist choices in terms of how the selected alternatives can meet the underlying needs that the tourist desires to attain (e.g., relaxation or fun).

To illustrate these different components, consider a tourist’s mental representation of a city trip decision problem for a short weekend break. The tourist may be interested for example in experiencing some distractions from everyday life (Benefit 1) and in learning about a different culture (Benefit 2). In order to evaluate how different choices affect these outcomes, the tourist might consider each potential destination city’s nightlife (Attribute 1) and cultural attractions (Attribute 2). Furthermore, the possibility to travel with friends or not at different dates (Situational variable 1) can also impact these benefits (e.g., experienced distractions from everyday life are higher when it is possible to travel with friends). Jointly, these components and their links provide a (simplified) mental representation of the tourist’s decision problem and allow the tourist to evaluate the decision utility of the different alternatives that are available.

The Structure of Mental Representations

The components introduced in the previous section suggest three types of causal relations in tourists’ mental representations, namely, between decision variables and attributes (D-A), between attributes and benefits (A-B), and between situational variables and benefits (S-B). The structure further implies that decision and situational variables are the cause of a certain benefit realization and that benefits in turn are the consequence of the choice(s) that the tourist makes. Attributes are intermediate components in this structure that can be causally impacted by decisions and situational variables on the one hand and that are the cause of benefit realizations on the other.

Besides these core causal relations, two additional types of relations may appear in mental representations. First, there can also be causal relations between attributes only (A-A). For example, tourists could consider a city’s student population (Attribute 3) because they think that the presence of a student population makes the city’s nightlife activity (Attribute 1) more attractive. Second, there can be causal relations between situational variables and attributes (S-A). For example, the season in which the tourist undertakes a trip (Situational variable 2) may codetermine what cultural offerings are available in the city.

As mental representations represent causal knowledge structures about the relationships between the variables that they include, they can be graphically mapped as networks of nodes (variables) and causal links. This structure furthermore allows that mental representations are analyzed as belief networks that link action alternatives (decision alternatives), on
the one hand, to outcomes on the individual’s need dimensions on the other (Arentze, Dellaert, and Timmermans 2008). Figure 1 shows the mental representation of the example of the city trip decision problem depicted as a causal network.

The Formation of Tourists’ Mental Representations

Having introduced the concept of mental representations, the objective of this section is to provide a more formal explanation for the formation of mental representations and more specifically the cognitive activation (or not) of different components in tourists’ mental representations. A crucial element of the conceptualization of this explanation is that mental representations are tailored to the task and situational setting at hand. The decision task (e.g., a family holiday decision, or a weekend break decision), the available alternatives, and the situational conditions determine which needs are activated with the individual tourist, which travel alternatives are available to choose from, and what the consequences of the different choices are. As a consequence, different situation–task combinations tend to trigger activation of different mental representation variables and causal links.

To be able to use a mental representation when evaluating alternatives, it should be held in working memory to allow for active simulation of different courses of action. This implies that the amount of information that can be used is limited. The resulting mental representation therefore comprehends only the components and causal relations that are most essential to the decision. The reason is that the cognitive effort involved in making a decision becomes increasingly challenging when additional information is considered. The combination of situation-dependent relevance and cognitive capacity constraints implies that a change in a situational setting (e.g., weather conditions) may also cause a shift in the components in the tourist’s mental representation (e.g., outdoor vs. indoor activities). The tourist would experience this as a cognitive switch when it occurs, that is, a qualitative change in his or her view on the decision problem.

A tourist’s construction of a mental representation is the result of an (implicit) trade-off between the costs of the mental effort of activating the components and links in the mental representation and the expected gains of being able to evaluate different decision alternative–attribute–benefit (DAB) chains. This trade-off represents an implicit evaluation of the extent to which a choice of a decision alternative (D) determines the achieved degree of a benefit (B) due to the present state of attribute (A). If a choice has only little effect on a certain benefit, the corresponding DAB chain should not be activated in the tourist’s mental representation. For the sake of simplicity, we assume that not more than one attribute may occur in a DAB chain.

Thus, more formally, whenever the expected gain $Z_{ijk}$ of taking into account a DAB chain with decision variable $k$, attribute $j$, and benefit $i$ exceeds the mental costs $C_{ijk}$ of activating the chain in the mental representation (i.e., $Z_{ijk} > C_{ijk}$), the corresponding DAB chain is included in the mental representation. The terms $Z_{ijk}$ and $C_{ijk}$ are not a priori known to the decision maker, and their assessment is based on an individual’s experience-based knowledge. The cost component $C_{ijk}$ takes into account the mental effort for memory retrieval, inference, judgment, etc., in order to derive consequences of decision variable $k$ on attribute $j$ and consequences of attribute $j$ on benefit $i$. The gain component of evaluating a certain DAB chain can be understood as the expected size of the utility differences it reveals when all choice alternatives (D) are evaluated on that attribute–benefit combination (AB). The standard deviation of all utility values across alternatives of decision variable $k$ with respect to benefit–attribute relation $ij$ can be applied to determine this expected gain $Z_{ijk}$ (Arentze, Dellaert, and Chorus 2013). The assessment of the utility values is based on the tourist’s knowledge about the causal influences that allow an evaluation of the impact of choices on his or her needs, on the one hand, and activation of needs in the current decision situation, on the other.

The gain of including a certain DAB chain in the mental representation is a multiplicative function of benefit activation and the strengths of the links. Both have to be present in the mental representation to create a connection between the decision and the benefit outcome. Consequently, the gain is zero if the benefit has zero activation or if the decision has no consequences for attaining the benefit. A tourist has cognitive access to these factors when constructing a mental representation because they are based on the tourist’s own

![Figure 1. Example of a simplified tourist mental representation for a city trip destination choice.](image-url)
knowledge of the decision problem. Benefit importance is directly observable to the individual as a reflection of the current state of his or her internal needs (e.g., the tourist’s need for distraction from everyday life) and assessment of link presence is based on the tourist’s causal knowledge of the decision domain (e.g., knowing that destination choice for a holiday trip generally has a strong impact on the cultural offer). In sum, causal knowledge in combination with a notion of one’s own subjective state allows tourists to assess the gain of a given DAB chain. If the mental costs to include the chain in the tourist’s mental representation are not expected to be higher than the chain’s potential utility impact, it is included in the tourist’s mental representation of the decision.

**Measuring Tourists’ Mental Representations**

Measuring mental representations is challenging for a number of reasons. First, mental representations are latent constructs stored in working memory. In order to get access to a tourist’s mental representation, the active cooperation of the individual is required. A second related difficulty is that tourists are not necessarily fully aware of their exact mental representation. Therefore, mental representations need to be rendered conscious before they can be measured or elicited. A third reason is the dynamic character of mental representations due to contextual effects and variations in need activation.

Several potential approaches exist for measuring mental representations that cope with these challenges in different ways. Several of the techniques are adapted forms of laddering (Reynolds and Gutman 1988). A key difference is that in mental representations of decision problems no values are elicited but that they focus on attributes and benefits, potentially with the addition of situational variables. These mental representations are triggered by a given decision problem and should allow the decision maker to assess the outcomes of his or her choice in terms of their performance with respect to needs that are relevant in the decision problem.

In the face-to-face laddering approach to mental representation elicitation, a structured personal interview is used in which the interviewer first questions respondents to discover the most important attributes in the decision alternatives that are investigated. For each mentioned attribute, respondents are then asked why they take into account this attribute in making their decision (as a mean to what end). The resulting ladders or means–end–chains can be summarized in a graphical hierarchical mapping. No content-oriented suggestions are provided by the interviewer during the interview so as to not influence the memory retrieval process for any of the response levels of the laddering interview. This has as a consequence that the time investment for respondents to come up with responses is quite high, which may lead to fatigue and socially desirable responses.

In response, “hard” laddering was introduced (Botschen and Thelen 1998) that presents respondents with predefined attributes and benefits from which respondents are asked to select the relevant ones. The sequence of the interview according to the laddering protocol remains the same. Ter Hofstede et al. (1998) further streamlined the elicitation process and kept the revealed handling of predefined attributes, consequences, and values but simplified the repetitive laddering format. In this association pattern technique (APT), variables are not elicited one by one. Rather, APT consists of matrices where respondents can indicate causal links between attributes and benefits by ticking off the corresponding links. All connections are thus elicited more or less simultaneously in a fixed format. This entails that this technique may easily overrepresent the activation of mental representation components and links compared to a more spontaneous mental representation elicitation format.

Recently, an additional interview method, CNET (causal network elicitation technique), was developed (Arentze, Dellaert, and Timmermans 2008). The method has been tested and applied to collect data on mental representations of shopping trip decisions (Dellaert et al. 2008). The CNET method is designed to reveal mental representations in a semistructured face-to-face interview with a respondent who is presented with a certain choice problem and its context. First, respondents are confronted with decisions they need to make. They are asked to select the sequence in which they prefer to deal with them. Next, the interview proceeds through the list of decision variables in the selected order and, for each decision, the respondent is informed about the alternatives. Respondents are asked about their considerations when facing these alternatives. The interviewer uses a predefined list of attributes, benefits, and situational variables specifically developed for the decision problem under concern to identify the response. If a response does not match with any of the variables in the list, the interviewer adds it. The list is not shown to the respondent, as this could induce recall of variables that are not part of the mental representation.

Having identified the variable, the next step depends on the variable type. If the variable is an attribute, the interview proceeds with the question why the variable is influential in this case. This “why” question generally results in the identification of an underlying benefit generated by the attribute, in which case no further “why” questions are needed. If another attribute is mentioned in the response, the “why” question is repeated until an underlying benefit emerges. When the originally mentioned variable is a benefit, the interview proceeds with the question how this variable is determined. This “how” question leads to the identification of situational or alternative attributes that drive the benefit. The causal links are also established by these questions and are verified by the interviewer with the interviewee when in doubt. Further considerations are prompted by repeating this procedure until the respondent has no further considerations.
Even only after arriving at the destination. The destination may be decided upon briefly ahead of the trip, or accommodation may be selected. Finally, detailed activities at the moment in time important aspects such as airline and accommodation may be selected. Also around that same time, a tourist may decide on the approximate timing of the trip (i.e., two years from now), but only as the travel data approaches, the detailed timing may be decided upon. Also around that same moment in time important aspects such as airline and accommodation may be selected. Finally, detailed activities at the destination may be decided upon briefly ahead of the trip, or even only after arriving at the destination.

This decision structure suggests promising research opportunities for future research that extend the current mental representation models and methods toward a dynamic setting in which the sequential nature of tourist decision making is more clearly supported (see Table 1 for a summary of future research questions). While the introduction of sequential decisions itself is part of the existing framework, currently the sequencing is only done at one point in time (e.g., transportation and destination choice for a trip to be made next week). Tourist decisions are typically stretched out over time, and how to extend the approach to facilitate longer decision intervals should be investigated for complex travel decisions.

One could consider measuring and modeling mental representations at several different points in time, which would allow for dynamic updating of the mental representation and the resulting decisions outcome predictions. For example, the mental representation of the transportation decision may shift strongly depending on whether a destination is selected that is within driving distance or not.

A dynamic approach to mental representation modeling and measuring would be important for tourism research also for a second reason. It is a fact that tourists will often search for information about their trip and will learn in between the different choice components of their decisions (e.g., Fodness and Murray 1999; Gitelson and Crompton 1983; Gursoy and McCleary 2004; Jun, Vogt, and MacKay 2007; Pan and Fesenmaier 2006; Vogt and Fesenmaier 1998). This information search process is likely to shift tourists’ perception of the different travel attributes and benefits and their causal links (e.g., when a tourist learns about the climate in various parts of Australia) and hence also of the need to activate these decision aspects in the mental representation. Thus, a dynamic model of tourists’ mental representations of complex travel decisions would need to allow for updating over time of the utility value of different DAB links.

Of particular interest in this respect is also the way in which tourists mentally represent uncertainty with respect to the travel options. Travel risk is an important aspect of many tourists’ decisions (Money and Crotts 2003) and it would be

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highly valuable to develop a better understanding of, first, how risks are taken into account in tourists’ mental representations of travel decisions and, second, of how mental representations of risky decisions are updated as more information becomes available to the tourist and uncertainty reduces in the course of the sequential travel decision process.

An additional aspect that is worth mentioning concerns the mutual influence between tourists’ activities during their trip and their benefit focus and needs. This type of need dynamics is proposed in the theory and model of Arentze and Timmermans (2009) to explain individuals’ activity choice and time use in daily-life activities such as shopping, recreation, and social activities. According to this theory, needs such as restocking goods, socializing, and relaxation, built up over time with speeds depending on the nature of the need and an individual’s characteristics. Although the activities of a tourist’s activity repertoire are primarily focused on a stable set of benefits (e.g., fun and excitement), each activity generally has an influence on multiple need dimensions. For example, a shopping activity tends to have a positive or negative influence on needs such as socializing, being in the open air and entertainment. As a consequence of the many-to-many relationships there is a complex interaction between the activities conducted and strengths of the needs at any moment in time. This framework helps to explain positive and negative substitution effects between activities, saturation effects, and variety-seeking behavior in individuals’ activity choice. In tourist choice, such mechanisms are likely to be relevant in the choice of activity programs and itineraries within and across days of a trip. Combining the theories of need dynamics and mental representation formation provides a framework that can help to develop a better understanding of tourists’ choice behavior within trips.

Eventually, a similar approach could be used to also develop a better understanding of differences in mental representations and decision outcomes between first-time and repeat travelers to a certain destination (Kemperman, Joh, and Timmermans 2004; Lehto, O’Leary, and Morrison 2004; Oppermann 1997). A dynamic approach to modeling mental representations is very relevant when tourist travel choice is considered in a longer-term perspective to explain differences in preferences related to travel life cycle (Oppermann 1995). Generally, various needs can be active and dominant over time with speeds depending on the nature of the need and an individual’s characteristics. Although the activities of a tourist’s activity repertoire are primarily focused on a stable set of benefits (e.g., fun and excitement), each activity generally has an influence on multiple need dimensions. For example, a shopping activity tends to have a positive or negative influence on needs such as socializing, being in the open air and entertainment. As a consequence of the many-to-many relationships there is a complex interaction between the activities conducted and strengths of the needs at any moment in time. This framework helps to explain positive and negative substitution effects between activities, saturation effects, and variety-seeking behavior in individuals’ activity choice. In tourist choice, such mechanisms are likely to be relevant in the choice of activity programs and itineraries within and across days of a trip. Combining the theories of need dynamics and mental representation formation provides a framework that can help to develop a better understanding of tourists’ choice behavior within trips.

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**Conclusion and Discussion**

Many tourist choices such as different combinations of transportation, destination, and activity choices are complex in nature. They require interrelated choices on multiple dimensions and involve choice sets that may have very many alternatives with outcomes that are hard to predict. Because of cognitive limitations, tourists’ mental representations of such decision problems necessarily involve strong simplifications of reality in terms of the attributes and benefits that they consider. This also affects the choices that they make. Thus, in order to understand tourist choice behavior, it is important to gain insights into how the selective activation of attributes, benefits, and their links comes about in tourists’ mental representations of the decisions that they make.

We proposed a combined modeling and data collection approach that can be used to uncover tourists’ mental representations of complex decision problems. This approach allows one to construct models that connect the attributes of travel products to the benefits that tourists expect to derive from these products and the choices that tourists make. Using such analyses, the attribute weights in traditional tourist choice models can be interpreted better in terms of why (i.e., due to which benefit needs) they receive the weight that they do. Also it is more easily possible to identify travel alternatives that provide the same or similar benefits in the tourists’ eyes. Identifying such travel alternatives can help determine closely competing tourist products (e.g., destinations) and opportunities for new travel product development if new travel alternatives can be developed that provide the same benefits as already existing successful competitors.

From an academic research perspective, developing a better understanding of the dynamics of tourists’ mental representations of the decisions that they make seems an especially promising avenue for future research. This opportunity applies both to short- and long-term dynamics of tourist behavior. In terms of short-term dynamics, such as those observed in tourist information search, travel planning, and decision making within a single trip (e.g., Choi et al. 2012; Decrop 2010; Decrop and Snelders 2004; Dellaert, Ettema, and Lindh 1998; Fesenmaier and Jeng 2000; Gursoy and McCleary 2004; Jun, Vogt, and MacKay 2007; Pan and Fesenmaier 2006; Vogt and Fesenmaier 1998), tourists’ mental representation may shift depending on their focal interests and the information that they gain. In terms of long-term dynamics, tourists’ mental representations may shift depending on if they are first-time or repeat visitors or on how their preferences and travel learning shifts over time as they experience more and more travel alternatives (e.g., Kemperman,

Managerially, we also see several promising applications for tourism research that investigates tourists’ mental representations. First, in tourism communication, developing a deeper understanding of the benefits that tourists look for in their travels is likely to be of help in developing more appealing and more impactful communication campaigns. Tourists may be segmented based on the benefits that they value the most (e.g., Botschen, Thelen, and Pieters 1999; Shoemaker 1994), and different campaigns may be designed to appeal to these different segments. Furthermore, communications in these campaigns can explicitly link the attributes of different travel options to the benefits that tourists look for—based on their own mental representation of the decision problem and the dynamic decision stage that they are in. This approach is likely to further strengthen the impact of these campaigns and is closely in line with recently proposed models of advertising impact that allow for different in impact across different stages of the tourist decision making process (Park, Nicolau, and Fesenmaier 2013).

A second area where models of tourist mental representations are likely to be helpful is in the development of online and mobile applications that support tourists’ decision in different contextual circumstances. The use of tailored online communications is increasing in the tourism industry and tourists also increasingly integrate this type of communications in their decision making and travel product search (e.g., Fesenmaier et al. 2011; MacKay and Vogt 2012; Xiang and Pan 2011). For example, in certain instances, tourists may be interested in extensive and detailed background information about travel alternatives to support their decisions (e.g., in early stages of the travel search), but in other instances only certain focal information aspects may be of interest (e.g., under time pressure to find a transportation option). Especially in the latter condition, a better understanding of tourists’ mental representations can be important, because it allows one to target communications and choice alternatives directly to the tourist’s need at that specific instance. This is even more helpful now that many tourists are regularly using mobile devices, which imposes real limitations in terms of screen space and timing of information (Brown, Kappes, and Marks 2013; Gavalas and Kenteris 2012; MacKay and Vogt 2012). These communications and suggestions are likely to be most helpful to tourists in finding good travel alternatives and making their decisions.

Thirdly, the proposed approach can assist in developing a basis for cooperation and communication between different agent in tourism service delivery networks (Tax, McCutcheon, and Wilkinson 2013). Increasingly, different firms in the tourism value chain are challenged to cooperate to create greater overall value for tourists throughout the entire travel experience. This cooperation can be facilitated by a better understanding of how different alternatives in different tourist choices (e.g., subsequent destination and activity choices) can jointly deliver common underlying benefits to tourists (e.g., relaxation, excitement). Measuring and modeling tourists’ mental representations can help achieve such insights and provide a basis for selection of key components in the tourist value chain.

In summary, by allowing for greater insights in tourists’ mental representations of travel decisions, we hope that the model and method proposed in this paper can be of use to tourism researchers, tourism managers, and tourism policy makers to further advance the exciting developments in jointly tailoring communications and travel alternatives to the heterogeneous tourist population’s needs. This applies both to better meeting different tourists needs and to more flexibly adapting travel offers and communications to tourists when they are confronted with different travel circumstances and go through the different stages of their travel decision-making process.

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