

# **Bolstering Attitudes: An Introduction to the Foundations of Attitude Strength and Their Consideration in IS Adoption Research**

*Completed Research Paper*

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## **Abstract**

*Mixed results of attitude as a determinant of information system (IS) adoption suggest that there is more to an attitude's impact than evaluating the IS or its usage as favorable or unfavorable. This paper goes beyond the favorable-unfavorable valence of attitude by introducing the concept of attitude strength, which explains whether an attitude is strong, that is impactful and durable. First, a review of the social psychology literature synthesizes knowledge on strength-related attitude features, which function as indicators of strong attitudes. Subsequently, a review of the IS adoption literature reveals that based on these features, IS adoption research is far from using the potential the attitude strength concept offers. Finally, this paper proposes a framework that integrates the strength-related attitude features in an IS adoption context. The framework is meant to guide future application of attitude strength toward a better understanding of an attitude's impact in IS adoption.*

**Keywords:** Attitude, attitude strength, strength-related attitude features, IT adoption

## **Introduction**

Whether an individual favors or disfavors an information system (IS) is reflected by the individual's *attitude* toward it (Eagly and Chaiken 1993), and regarding research in IS, among the three most frequently employed independent variables in explaining IS adoption behaviors (Jeyaraj et al. 2006). However, although grounded in strong theories of behavior like the theory of reasoned action (Fishbein and Ajzen 1975), results on attitude as an adoption determinant are mixed. While some findings support attitude as a significant adoption determinant (e.g., Hsieh et al. 2008; Pavlou and Fygenon 2006), other seminal work suggests a limited to insignificant effect (e.g., Davis et al. 1989; Venkatesh et al. 2003).

In the attitude concept's root discipline, social psychology, insignificant relationships between attitude and behavior also showed these inconsistencies referred to as "attitude behavior gap" (Eagly and Chaiken 1993), which almost led social psychology to abandon the attitude concept (Wicker 1969, 1971). However, instead of abandoning it, research in social psychology went beyond by defining the concept of *attitude strength*. In the sense of attitude strength, an attitude is strong to the degree it endures and impacts the individual (Krosnick and Petty 1995). This extends the perspective on attitude from the sole matter of favorable or unfavorable valence to the qualities strong attitudes have: durability and impactfulness. These qualities are indicated by a large number of so-called *strength-related attitude features* (Eaton et al. 2009; Krosnick and Petty 1995; Visser et al. 2006). For example, the certainty with which the individual holds an attitude impacts if this attitude will guide the individual's behavior (e.g., Fazio and Zanna 1978; Sample and Warland 1973). Thinking of weak attitudes in this example illustrates the underlying challenge: If individuals are not sure about the attitudes they just reported in a survey, how can we expect their attitudes to be a strong guide of behavior? This notion exemplifies that strength-related attitude features like certainty are important wherever the qualities of attitude are of interest.

Evidence on the importance of strength-related attitude features also exists in the IS discipline. In the particular case of attitude certainty, for example, Ho and Bodoff (2014), Khalifa et al. (2012), and Kim et al. (2009) find attitude certainty to moderate the attitude-behavior relationship. While existent work recognizes the appeal of strength-related attitude features and calls for more research on their role in IS adoption (Bhattacharjee and Sanford 2009; Khalifa et al. 2012), it also notes the complexity of attitude strength in general (Bhattacharjee and Sanford 2009). A concept defined in terms of its resulting qualities (i.e., durability and impactfulness) seems hard to grasp. Although intuitive, the presented definition of attitude strength defines it as the impact attitude has on the dependent variable (e.g., IS usage behavior), leaving open what actually explains this strength. Thus, we focus in this paper on what renders attitude strength more tangible and lays the foundations for its application: the set of strength-related attitude features. In contrast to existing work in IS adoption, which introduces selected features in detail for the purpose of model building, we take a broad and inclusive perspective on these features. Although considered key for explaining the power of attitude in the concept's root discipline, IS adoption lacks a coherent view on the features and their implications. We thus pose the following research questions:

RQ1: Which strength-related attitude features indicate durable and impactful attitudes in social psychology?

RQ2: Which strength-related attitude features relate to durable and impactful attitudes in IS adoption?

RQ3: How can IS adoption research benefit from the durability and impactfulness of attitudes based on strength-related attitude features?

We attempt to provide two contributions by answering these questions. First, we bring attitude strength in the focus of IS adoption research by synthesizing knowledge on its foundations in terms of strength-related attitude features and by revealing the current state of its application in IS adoption. Second, we develop a framework of attitude strength and its features that is meant to guide future application of attitude strength toward a more holistic view on the qualities attitudes have in IS adoption contexts.

## **Research Background – Attitude and Its Strength**

### ***The Attitude Concept***

People evaluate the entities of their world in everyday life (Albarracin et al. 2005). In the information age for instance, we assess the looks of a new smartphone application and explore whether its functionality suits our purposes. We form an *attitude* toward the application and its usage, that is "a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (Eagly and Chaiken 1993, p. 1). An entity thereby refers to an object or behavior, for instance the application from the previous example or its usage. It is termed the attitude object (Eagly and Chaiken 1993). Because attitude represents a tendency internal to the individual, it is inferred from expressed evaluations of the attitude object (Eagly and Chaiken 1993). For example, if the individual expresses that using the application is a wise idea, the individual is assumed to hold a positive attitude toward using it. These expressed evaluations and thus the underlying attitude are located on a continuum ranging from very favorable (positive) to very unfavorable (negative). Evaluations are of cognitive, affective, or behavioral nature (Eagly and Chaiken 1993). Cognitive evaluations comprise evaluative thoughts and beliefs about the attitude object (e.g., using the application is a wise idea), affective evaluations evaluative aspects of feelings and emotions (e.g., using the application makes me feel good), and behavioral evaluations evaluative intentions and overt behavior (e.g., recommending the application to a friend).

However, empirical evidence on the meaningfulness of evaluating an attitude object only in terms of favorable or unfavorable valence is mixed (e.g., Wicker 1969). One potential shortcoming appears to stem from the evaluation's character of a summary evaluation. The evaluation is assessed by averaging multiple measurement items (Himmelfarb 1993), which hides the underlying structure and thus the nature of the summary evaluation. Imagine an individual who evaluates using the smartphone application as a very wise idea, but does not like its looks at all. The individual's attitude nets out at about the midpoint on the favorable-unfavorable dimension, just like the attitude of an individual who is simply neutral on both aspects of the application. Although quantified with the same number, both attitudes have different underpinnings. This suggests that there may be more to an attitude's meaningfulness than the evaluation.

### ***Attitude Strength – Focusing Attitudinal Quality***

*Attitude strength* is inherently linked with the quality of an attitude. It is commonly viewed as "the extent to which attitudes manifest the qualities of durability and impactfulness" (Krosnick and Petty 1995, p. 3). That is, two identical attitudes may differ significantly in how enduring and influential they are. In the context of the previous smartphone application example, two individuals may hold both a highly positive attitude toward using the application. However, the attitude of one individual may endure and impact whether the individual is actually using the application, while the attitude of the second individual may be volatile and have less impact on application usage. The attitudes differ in their strength.

The first strength quality, durability, is concerned with the development of an attitude. It includes the aspects of *persistence* and *resistance*. An attitude with a high degree of persistence remains unchanged in a longitudinal sense over the course of time, even if never challenged (Krosnick and Petty 1995; Petty et al. 1995). Resistance is the ability of an attitude to withstand an explicit attack, for example an attempt to change the attitude (Krosnick and Petty 1995; Petty et al. 1995). The second strength quality, impactfulness, deals with how an attitude influences mental and behavioral processes. It contains an attitude's *influence on information processing and judgment* and its *impact on behavior*. Strong attitudes are thought to exert a greater influence on information processing and judgment than weak attitudes. They create a bias in mental information retrieval processes and in decision making (Krosnick and Petty 1995). Impact on behavior refers to the power of an attitude to guide behavior (Krosnick and Petty 1995). Strong attitudes are considered more likely to do so than weak ones. In short, an attitude is considered strong to the degree it manifests the quality aspects of persistence, resistance, influence on information processing and judgment, and impact on behavior.

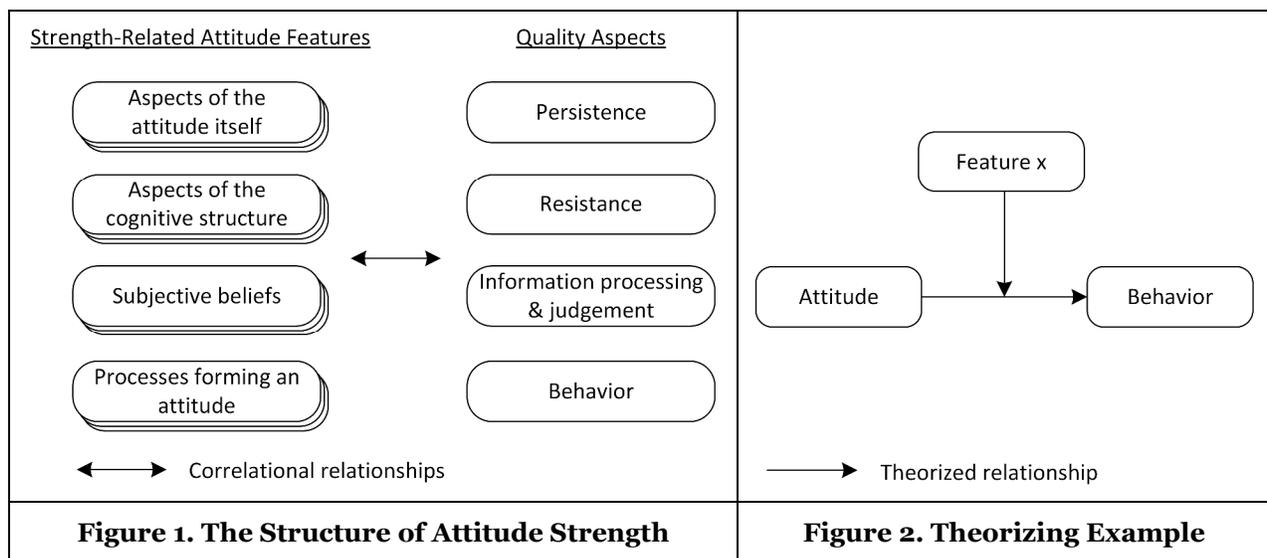
### ***Strength-Related Attitude Features – The Foundations of Attitude Strength***

With respect to the structure of attitude strength, a number of *strength-related attitude features* are known in social psychology to be associated and correlated with the above presented qualities of strong

attitudes (Eaton et al. 2009; Krosnick and Petty 1995; Visser et al. 2006). Strength-related attitude features – like the importance an individual attaches to an attitude (Boninger et al. 1995), the certainty with which the individual holds the attitude (Gross et al. 1995), or the accessibility of the attitude from the individual's memory (Fazio 1995) – correlate each with at least one of the four defining quality aspects of attitude strength (Krosnick and Petty 1995). The set of strength-related attitude features contains aspects of the attitude itself, aspects of the cognitive structure that are associated with the attitude and attitude object in the individual's memory, subjective beliefs the individual holds about the attitude and attitude object, and processes by which an attitude is formed (Krosnick and Petty 1995), as depicted in Figure 1.

From a conceptual perspective, the strength-related attitude features are distinct constructs (DeMarree et al. 2007; Krosnick and Petty 1995). The meanings of features like the importance an individual attaches to an attitude or the certainty with which this attitude is held are readily distinguishable. This multidimensionality among the features is also empirically supported by exploratory, principal components, and confirmatory factor analyses (Erber et al. 1995; Krosnick et al. 1993; Pomerantz et al. 1995), depending on the taken approach to different degrees (see Eaton et al. (2009) for a further discussion). Empirical analysis of the at most partly overlapping structures associated with strength-related attitude features further supports the distinctiveness of the features (Visser et al. 2006). From an operational perspective, there exist two ways of measuring strength-related attitude features. First, a feature can be measured based on self-reports of individuals (Krosnick and Abelson 1992; Bassili 1996; Wegener et al. 1995). Individuals reply to a set of questions, for example how certain they are about their attitude in case of the certainty feature (Krosnick and Schuman 1988), and thus state the impression they have of the feature (Bassili 1996). Second, a feature can be measured in an operative way (Bassili 1996). Operative measures are linked to the processes that cause attitude-based evaluations (Bassili 1996; Wegener et al. 1995). For example, after asking individuals whether using a particular smartphone application is a wise idea, the time it requires the individuals to form an answer and respond is clocked in order to gauge the accessibility of the individuals' attitudes (Fazio 1995). A low response latency indicates a highly accessible and thus strong attitude. In total, all strength-related attitude features are measurable by self-reports, but not all are measurable by operative means (Bassili 1996).

In order to apply the attitude strength concept in research, theorizing draws on the direct association of strength-related attitude features with the four quality aspects of strong attitudes. The features are combined in a triadic relationship with the attitude construct and the quality aspects that are relevant in the development of the respective conceptual model. For example, strength-related attitude features are used in social psychology as moderators of the attitude-behavior relationship (see the reviews of Cooke and Sheeran (2004); Glasman and Albarracín (2006); Kraus (1995)). This exemplary triadic relationship is illustrated in Figure 2. A concrete instance of this pattern is the rationale that the more important an attitude is to the individual, the more likely it impacts the individual's behavior (Boninger et al. 1995).



Empirical evidence confirms these theorized triadic relationships between attitude, strength-related attitude features, and the qualities of strong attitudes (Eaton et al. 2009; Krosnick and Petty 1995; Krosnick et al. 1993). Strength-related attitude features serve thereby as the missing link between attitude and its qualities. They indicate attitude strength (Eagly and Chaiken 1998) and thus represent the toolset for distinguishing strong from weak attitudes (Krosnick and Petty 1995; Krosnick et al. 1993; Visser et al. 2006). Strength-related attitude features explain which attitudes persist over time (e.g., Krosnick 1988b), resist change (e.g., Johnson and Eagly 1989), influence information processing and judgment (e.g., Smith et al. 1996), and guide behavior (e.g., Cooke and Sheeran 2004). Thus, the strength-related attitude features render attitude strength a tangible and meaningful concept. They lay the foundations for its application from conceptual, operational, and empirical perspectives. In conclusion, the strength-related attitude features open a new perspective on attitude – the attitude strength perspective. Attitude strength extends the traditional notion of attitudes from favorable-unfavorable evaluations to the qualities these evaluations have. Those qualities lie at the heart of scientific inquiry on attitudes: A given evaluation only contributes to answering a question if it endures and impacts, if it is strong.

### ***Investigating Strength-Related Attitude Features in IS Adoption***

Via the theory of reasoned action (Fishbein and Ajzen 1975) and the theory of planned behavior (Ajzen 1991) from social psychology, attitude found its way into IS adoption (e.g., Davis et al. 1989; Taylor and Todd 1995). Since then, attitude features alongside perceived usefulness and ease of use prominently among the three most frequently employed concepts in explaining individuals' IS adoption behaviors (Jeyaraj et al. 2006). However, when it comes to the effectiveness of explaining IS adoption behaviors, attitude shows limited explanatory power in the original version of the technology acceptance model (Davis et al. 1989) and continues to have mixed effects in subsequent work (e.g., Venkatesh et al. 2003; see Sun and Zhang (2006) for a review). These puzzling findings triggered valuable work that improved the explanatory power of attitude by, for example, focusing on behavior as the attitude object (Zhang et al. 2008) or on the cognitive dimension of attitude (Yang and Yoo 2004). Focus shifted from the question of if attitudes explain IS adoption at all to under which circumstances they do so.

In essence, this means a shift of attention from the pure evaluation of an IS by the individual to the meaningfulness of this evaluation. Which attitudes impact IS adoption and which do not becomes the key issue. This key issue is inherently linked to the attitude strength concept because it raises questions about the impactfulness and durability of these attitudes, that is about their strength, and raises questions about the circumstances under which they show these qualities, that is about the associated strength-related attitude features. So, from a theoretical standpoint, the attitude strength concept is predestinated to provide answers to these questions toward a better understanding of an attitude's power in IS adoption. In contrast to attitude, however, attitude strength appears to have received only little attention in IS adoption research. An explorative search with the search string "*adoption*" AND "*attitude strength*" in the AIS Senior Scholars' Basket of Journals (AIS 2011) yields 12 results, whereas dropping "strength" from the same string returns 1,059 results. This is a striking ratio. It suggests that although IS adoption research is employing and discussing attitude frequently, the concept that explains what IS adoption is interested in, the durability and impactfulness of attitudes, receives currently little attention. Although scarce, empirical work on strength-related attitude features, the foundations of attitude strength, indicates the benefits of considering attitude strength in IS adoption. For example, Ho and Bodoff (2014) show that effortful thinking creates attitudes that are persistent in IS contexts and the mental involvement with the attitude object (Angst and Agarwal 2009) relates to the resistance of an attitude against attempts to change it. Regarding (intended) system usage, the certainty with which an individual holds an attitude (Ho and Bodoff 2014; Khalifa et al. 2012; Kim et al. 2009) and an individual's IS expertise (Bhattacharjee and Sanford 2009) impact whether an attitude guides behavior.

In contrast to the scarcity in IS adoption, social psychology has yielded a myriad of strength-related attitude features (Krosnick and Petty 1995) and after decades of research, a fairly broad consensus on the set of strength-related attitude features and their role in the attitude strength concept is reported (Eaton et al. 2009; Visser et al. 2006). With increased clarity on the strength-related attitude features and their relationships to the four defining quality aspects of attitude strength, attitude strength gets less elusive. Attitude strength becomes tangible for non-psychologists who are interested in an attitude's durability and impactfulness in their research. Thus, we review in the following the strength-related attitude features' conceptualization, operationalization, and relationships with the quality aspects of strong

attitudes in social psychology toward supporting future application of attitude strength in IS adoption. The past diversity of strength-related attitude features furthermore suggests a fragmented view on attitude strength in IS adoption research. To our knowledge, a review of strength-related attitude features in IS adoption research does not yet exist. It is thus unclear to what extent IS adoption research is employing the attitude strength concept successfully in terms of the features and the associated attitude quality aspects. It may well be that, in contrast to the results of the explorative search prior in this subsection, some features enhance research already, but without explicit reference to the attitude strength concept. Either way, by a review of the current state of strength-related attitude features in IS adoption research we add in the following to the overall knowledge of the impact attitude has in IS adoption. The convergence on strength-related attitude features in social psychology sets the stage for a meaningful comparison of the features in social psychology and IS adoption. Features that are employed in social psychology but not in IS adoption hold the potential to contribute to the explanation of an attitude's influence in IS adoption. To this end, we identify those features in the following and work out ways of incorporating them in IS adoption research.

## **Methodological Approach**

In order to meet the research objective, a two-step literature review on strength-related attitude features was conducted. It included one review in social psychology and one review in information systems. The review was organized around the meaning of concepts (Webster and Watson 2002) and supplemented with data usually considered in secondary data analysis (Glass 1976). Strength-related attitude features represented the concepts (Webster and Watson 2002) of the review. Their meanings in both disciplines were of interest. Further, as becomes apparent from the structure of attitude strength, their relationships with the four defining quality aspects of attitude strength were required as well in order to understand their role in attitude strength. This added secondary data from existing empirical articles to the review (Glass 1976). For our purposes, we observed how the features were operationalized in empirical work in both disciplines and how they empirically related to the quality aspects of strong attitudes.

### ***Review in Social Psychology***

In order to ensure meaningful results in social psychology, we targeted the top 20 journals according to their 5-year impact factor in the 2013 ISI Web of Knowledge Journal Citation Reports (JCR)<sup>1</sup> for social psychology. ISI impact factors are well-established indicators of journal quality across disciplines (Lowry et al. 2013) and thus suited to guide a review in a discipline other than our home discipline. The journals are in alphabetic order *Advances in Experimental Social Psychology*, *British Journal of Social Psychology*, *Child Abuse & Neglect*, *Cyberpsychology Behavior and Social Networking*, *European Journal of Personality*, *European Journal of Social Psychology*, *European Review of Social Psychology*, *Journal of Experimental Social Psychology*, *Journal of Health and Social Behavior*, *Journal of Nonverbal Behavior*, *Journal of Personality*, *Journal of Personality and Social Psychology*, *Journal of Research in Personality*, *Law and Human Behavior*, *Organizational Behavior and Human Decision Processes*, *Personality and Social Psychology Bulletin*, *Personality and Social Psychology Review*, *Psychology of Men & Masculinity*, *Political Psychology*, and *Research on Language and Social Interaction*.

The search strategy in social psychology targeted the prior reported consensus on the set of strength-related attitude features. We thus searched for reviews and meta-analyses of the features. With a plethora of investigated features (Krosnick and Petty 1995) and an early review published in 1968 by Scott already, we arguably assumed to identify such a consensus at this level of analysis. We thus defined the following criteria for a relevant article: 1) The article had to be published in one of the selected journals. 2) The article had to contain the term "*attitude strength*". 3) The article had to contain at least one of the terms "*review*", "*meta-analysis*", "*overview*", or a synonym for "*strength-related attitude features*" as used by Krosnick and Petty (1995) or Eaton et al. (2009). 4) The article had to include a review or meta-analysis of strength-related attitude features; with a minimum requirement of at least conceptually defining two features with references to original articles.

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<sup>1</sup> <http://admin-apps.webofknowledge.com/JCR/JCR>, accessed February 16, 2015

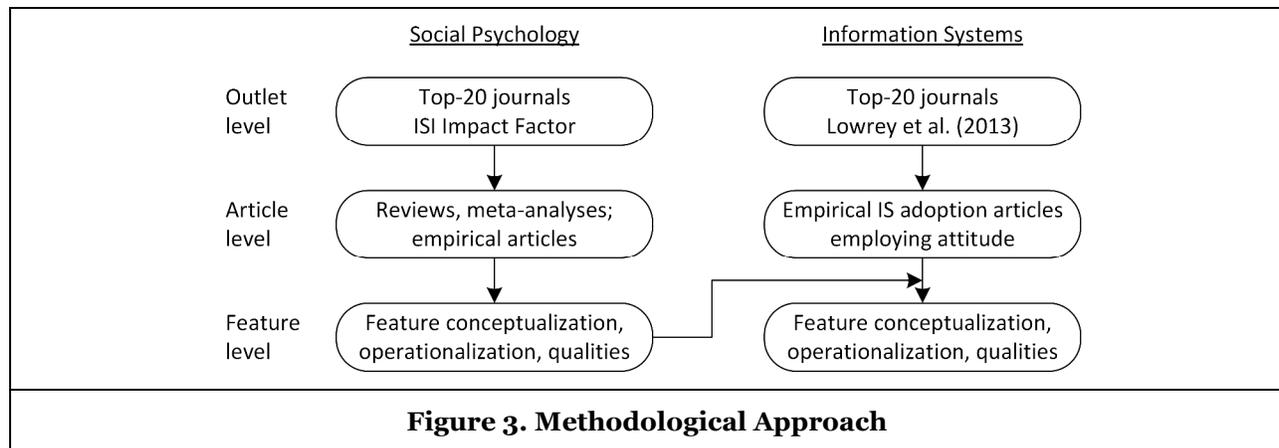
We searched the full text of the journals from 1 according to criteria 2 and 3. This resulted in 610 retrieved articles that were in turn manually scanned for relevance according to criterion 4. If an article referenced a review or meta-analysis, the referenced work was retrieved and assessed according to criterion 4 as well. This procedure yielded 19 reviews and meta-analyses, which were referenced by 117 out of the 610 retrieved articles. This indicates good coverage of existing reviews and meta-analyses. Subsequently, we extracted data on the strength-related attitude features from the reviews and meta-analyses. First, we extracted their conceptualizations and classified features based on Krosnick and Petty (1995) in aspects of the attitude itself, aspects of the cognitive structure, subjective beliefs, and processes forming an attitude. Second, we gathered the different operationalizations of the features based on references to empirical articles. Third, we extracted evidence on the features statistically significant relationships with the four quality aspects of attitude strength based on references to empirical articles. In a last step, we composed the final list of strength-related features. For a feature to be included in the final list, its significance had to be backed by existing empirical evidence and the feature had to appear in at least two reviews or meta-analyses in order to further strengthen focus on well-researched features.

### ***Review in Information Systems***

Toward meaningful results in the IS discipline, we considered the following top mainstream IS journals (in alphabetic order): Decision Support Systems, Electronic Commerce Research and Applications, European Journal of Information Systems, Information & Management, Information Systems Frontiers, Information Systems Journal, Information Systems Management, Information Systems Research, Information Technology and Management, International Journal of Electronic Commerce, Journal of Computer Information Systems, Journal of Global Information Management, Journal of Information Technology, Journal of Management Information Systems, Journal of Organizational Computing and Electronic Commerce, Journal of the Association for Information Systems, Journal of Strategic Information Systems, Journal of Database Management, MIS Quarterly, and MIS Quarterly Executive. The selection contains the seven journals identified by Lowry et al. (2013) as 1<sup>st</sup> tier and 2<sup>nd</sup> tier top quality, mainstream IS journals, the AIS Senior Scholars' Basket of Journals (AIS 2011) and the next 12 highest-ranked journals according to their composite bibliometric rank in Lowry et al. (2013).

The search strategy in information systems explored the degree to which strength-related attitude features are applied in empirical IS adoption research. Since research on attitude strength in IS adoption appears to be scarce, we refrained from searching for attitude strength explicitly. Instead, we searched for empirical investigations in IS adoption that employ the attitude concept in conjunction with the features retrieved in the preceding search in social psychology. This allowed for including articles that do not explicitly recognize the attitude strength concept, but capitalize on the relationships of the features with the quality aspects of strong attitudes. We thus derived the following inclusion criteria: 1) The article had to be published in one of the selected journals. 2) The article had to be published between the introduction of attitude as an adoption determinant by the technology acceptance model in August 1989 (Davis et al. 1989) and the end of the first quarter 2015 (including online publications in advance). 3) The article had to contain the term "*attitude*" or affiliated terms from literature (Bohner and Dickel 2011; Fishbein and Ajzen 1975). 4) The article had to investigate empirically the interplay of attitude, at least one of the strength-related attitude features from the prior review in social psychology, and at least one of the four quality aspects of attitude strength. 5) The article had to be situated in an IS adoption context.

We searched the full text of the journals from 1 according to the criteria 2 and 3. This resulted in an initial sample of 2,097 articles, which was in turn manually refined by assessing the relevance of the retrieved articles in accordance with criteria 4 and 5. This final sample consisted of 16 articles. From the final sample, we extracted the same data on strength-related attitude features like in the social psychology part of the review. All data were extracted directly from the articles. Taken all together, figure 3 illustrates the methodology of the two-step literature review.



## Results

The literature review identified 13 strength-related attitude features in social psychology, out of which five features were found to explain an attitude's qualities in existent IS adoption research. The features are presented in the following, grouped by discipline and category.

### *Strength-Related Attitude Features in Social Psychology*

The strength-related attitude features from social psychology fall into all four categories of the present review and are presented accordingly in the following sub-subsections.

#### **Aspects of the Attitude Itself**

The *extremity* of an attitude refers to the extent to which the attitude deviates from neutrality, i.e. the degree of favorableness or unfavorableness (Krosnick and Petty 1995). It is operationalized in an operative way by computing the amount a response on a bipolar attitude scale (see Himmelfarb 1993) deviates from the scale's midpoint (Krosnick et al. 1993). Extreme attitudes are more resistant to change than moderate ones (e.g., Ewing 1942; Osgood and Tannenbaum 1955) and exert a greater influence on information processing and judgement (e.g., Allison and Messick 1988; Judd and Johnson 1981). They are also stronger guides of behavior (e.g., Fazio and Zanna 1978; Petersen and Dutton 1975).

*Intensity* is a specific type of extremity. It focuses on the extremity of affective evaluations and is defined as the strength of emotional reactions provoked by an attitude object in an individual (Krosnick et al. 1993). This strength is measured by self-reports of individuals who state on a dedicated scale how strong their feelings toward the attitude object are (Cantril 1946). As an alternative to a dedicated scale, intensity is operationalized operatively by computing the deviation of a response from the neutral point of a bipolar attitude scale that measures affective evaluations (Prislin 1996). With respect to the quality aspects, intense attitudes are found to persist over the course of time (Schuman and Presser 1981).

#### **Aspects of the Cognitive Structure**

The *accessibility* feature builds on the assumption of an attitude being stored in human memory as an association between attitude object and evaluation. It posits that the stronger this association, the more likely it is activated from memory automatically when the individual encounters the attitude object. The attitude is more accessible (Fazio 1995). Accessibility is operationalized with response latencies. The time it requires individuals to express their evaluation of the attitude object in response to an inquiry (e.g., an attitude questionnaire item) is clocked and serves as a proxy for the accessibility of their attitudes (e.g., Fazio and Williams 1986). A further, less frequently applied operative measure is the likelihood of giving the attitude object as an answer to an open ended question (Krosnick 1988b). Besides operative measures, individuals also report how quickly their evaluation came to mind (e.g., Bassili 1996) or how often they think about the attitude object, with a high frequency indicating high accessibility (e.g., Brown 1974). Attitudes that are more accessible persist over time (Hodges and Wilson 1993), resist change (Bassili and

Fletcher 1991), influence information processing and judgment (e.g., Fazio et al. 1989; Smith et al. 1996), and impact behavior (e.g., Fazio and Williams 1986; Fazio et al. 1989).

*Ambivalence* is concerned with the structure of an attitude. It refers to the degree to which an individual holds positive and negative evaluations of the attitude object at the same time. The more extreme both opposing evaluations are, the higher the ambivalence (Scott 1968). For example, an individual can be torn between rating surveillance software as beneficial or harmful. Ambivalence considers not only opposing cognitive evaluations like in the previous example, but also affective, and behavioral ones, within or across these classes (Eagly and Chaiken 1998). Operative measures commonly assess positive and negative evaluations on separate scales first and compute in a second step an index of ambivalence (e.g., Kaplan 1972). In self-reports, individuals report the degree to which they perceive having opposing evaluations (e.g., Priester and Petty 1996). Less ambivalent attitudes have more homogeneous structures and are thus stronger. They are more resistant to change (e.g., Armitage and Conner 2000; Haddock 2003) and have a stronger impact on behavior (e.g., Armitage and Conner 2000; Conner et al. 2002). Evidence whether they also persist over time is inconclusive (cf., Armitage and Conner 2000; Zaller and Feldman 1992).

*Evaluative-affective consistency* is a more specific feature of structure than ambivalence. It considers the consistency between an individual's overall evaluation of an attitude object on the one hand, and evaluative aspects of emotions, feelings, moods, and sympathetic nervous system activity related to the attitude object on the other (Chaiken et al. 1995). Inconsistency exists, for example, if an individual is generally in favor of using an application, but feels uncomfortable when using it. Evaluative-affective consistency is operationalized in an operative way similar to ambivalence. First, the overall evaluative (e.g., favorable-unfavorable) and the affective (e.g., comfortable-uncomfortable) dimensions are assessed on separate scales. Subsequently, a consistency index is formed based on this data (Chaiken et al. 1995). Although evaluative-affective consistency features in multiple reviews, empirical evidence on associated quality aspects appears scarce. Prislin (1996) shows that attitudes with consistent evaluative and affective components are more likely to persist over time. Prislin et al. (1998) report that attitudes higher in evaluative-affective consistency exert greater influence on information processing and judgement.

In the same vein as evaluative-affective consistency, *evaluative-cognitive consistency* relates the overall evaluation of an attitude object to beliefs about it. It is defined as the consistency between an individual's overall evaluation of an attitude object and evaluative aspects of thoughts and beliefs about the attitude object (Chaiken et al. 1995). Evaluative-cognitive consistency is also labeled affective-cognitive consistency in seminal work on the feature (e.g., Rosenberg 1968), with affect as a synonym for the overall evaluation of the attitude object (see Chaiken et al. 1995). We thus include this work under the label evaluative-cognitive consistency and consider discrepancies between affective and cognitive evaluations as ambivalence (see above). Evaluative-cognitive consistency is operationalized in the same way as evaluative-affective consistency, but with cognitive scales instead of affective scales (Chaiken et al. 1995; Wegener et al. 1995). That is, in a first step, the overall evaluative (e.g., favorable-unfavorable) and the cognitive (e.g., valuable-worthless) dimensions are assessed on separate scales, also with multiple cognitive scales per aspect when following the so-called expectancy-value approach (see, e.g., Fishbein and Ajzen 1975). Subsequently, a consistency index is calculated based on this data. Attitudes higher in evaluative-cognitive consistency are more stable over time (e.g., Prislin 1996; Rosenberg 1968) and more resistant to change (e.g., Chaiken and Baldwin 1981; Rosenberg 1968). They further have a greater impact on information processing and judgement (e.g., Chaiken and Yates 1985; Prislin et al. 1998) and are stronger guides of behavior (Norman 1975; Schlegel and DiTecco 1982).

*Embeddedness*, also referred to as *centrality* (Rokeach 1968), is the degree to which an attitude is connected to other attitudes, beliefs, and values of the individual (Scott 1968). It is theorized that the closer connected an attitude is to its surrounding structure in memory, the more likely it is to be activated if connected elements are activated. Further, a highly connected attitude is assumed to be more likely to resist change because thinking about the implications attitude change has for connected elements requires additional effort (Eagly and Chaiken 1998). Prislin and Ouellette (1996) measured embeddedness by the number of associations individuals reported in relation to the attitude object. They show that more embedded attitudes have a greater impact on information processing, judgment, and behavioral intention.

*Knowledge* refers to the amount of information an individual has about an attitude object and the content of that information (Krosnick and Petty 1995). It takes several forms. Working knowledge, that is the information individuals spontaneously retrieve from memory when encountering the attitude object,

focuses knowledge personally relevant to the individuals and thus relevant to their attitudes (Wood et al. 1995). It is assessed by having individuals list relevant information about the attitude object (e.g., Wood 1982). Other approaches emphasize objective knowledge in the form of factually correct information and assess it with quizzes (e.g., Sidanius 1988). A third approach addresses knowledge about the attitude object in general and is operationalized with individuals reporting the amount of knowledge they perceive to have (e.g., Davidson et al. 1985). Attitudes backed by knowledge are more resistant to change (e.g., Wood 1982; Wood et al. 1985). They further impact information processing and judgement (e.g., Iyengar 1990; Vallone et al. 1985) as well as behavior (e.g., Davidson et al. 1985; Kallgren and Wood 1986).

### **Subjective Beliefs**

*Certainty* is defined as the subjective sense of conviction or validity individuals have about their attitudes (Gross et al. 1995). This includes two aspects. First, individuals vary in how confident they are that their attitude represents their overall orientation toward the attitude object. Second, individuals vary in the degree to which they think their attitudes are correct (Krosnick and Petty 1995). Certainty is operationalized with individuals reporting how certain they are about their attitudes (e.g., Fazio and Zanna 1978), how easily their attitudes could be changed (e.g., Krosnick and Schuman 1988), or how difficult they found to state their attitudes (Stouffer et al. 1950). Attitudes held with greater certainty are more persistent (e.g., Bassili 1996; Pelham 1991), less susceptible to change (e.g., Marks and Kamins 1988; Swann and Ely 1984), impact information processing and judgement (Marks and Miller 1985), and guide behavior (e.g., Fazio and Zanna 1978; Sample and Warland 1973).

*Importance* is a further subjective belief. It is the degree of concern, caring, and significance individuals attach to their attitudes (Boninger et al. 1995). Importance is operationalized with self-reports. However, instead of asking individuals how important they perceive their attitudes (Haddock et al. 1996), individuals are often asked how important the attitude object is to them (e.g., Krosnick 1988a). Proponents of the latter format argue that it is easier to understand for individuals, more reliable, and highly correlated and thus interchangeable with the former (Boninger et al. 1995). The more important an attitude is to an individual, the more likely it is to persist over time (Krosnick 1988a; Schuman and Presser 1981), to resist change (e.g., Borgida and Howard-Pitney 1983; Rhine and Severance 1970), to influence information processing and judgement (e.g., Holbrook et al. 2005; Krosnick 1990), and to guide behavior (e.g., Jaccard and Becker 1985; Schuman and Presser 1981).

*Involvement* refers to the degree to which an individual's attitude is associated with the individual's self-concept (Johnson and Eagly 1989). That is, attitude objects that are highly relevant to the individual produce a sense of personal involvement (Krosnick and Petty 1995). Attitude objects and thus attitudes become relevant to the individual in three basic ways in an attitude strength context. First, because they are linked to an individual's values (value-relevant involvement). Second, because they are relevant for the impression an individual makes on others (impression-relevant involvement). Third, because they are linked to outcomes desired by the individual (outcome-relevant involvement) (Johnson and Eagly 1989). There exist also two further conceptualizations. The first, vested interest, is defined as the relevance of the attitude object to personal consequences and thus similar to outcome-relevant involvement (Crano 1995). The second, issue involvement, refers to the personal importance of the attitude object to the self-concept of the individual (Petty and Cacioppo 1979). Whether this integrates value- and outcome-relevant involvement is subject to debate (c.f., Petty and Cacioppo 1990; Johnson and Eagly 1989). Further, the conceptualization of issue involvement and the most common operationalization of importance are very similar, which carries the risk of confounding the two (Petty et al. 2007). The difference between the two is that issue involvement considers the importance to the self-concept, whereas the importance feature considers the subjectively felt importance by the individual in the sense of significance and caring (c.f., Boninger, Krosnick, Berent, et al. 1995; Petty et al. 2004). Taken together, the extent to which aspects of the individual's self-concept are linked to the attitude object is the defining characteristic shared by all conceptualizations of involvement.

One way of operationalizing involvement is to assess an individual's latitudes of rejection and non-commitment, in which an individual's high involvement is inferred from a high number of rejected positions along the attitudinal continuum and a low number of positions the individual did not rate at all (e.g., Sherif et al. 1973). Involvement is further assessed operatively by using the known group method. Individuals are grouped based on a known criterion (e.g., age) that allows to infer their involvement (e.g.,

Sivacek and Crano 1982). In self-reports, individuals are asked how personally relevant the attitude object is to them (e.g., Haugtvedt and Wegener 1994) or to which extent they are affected by the attitude object (e.g., Sivacek and Crano 1982). Higher involved individuals show attitudes that are harder to change (e.g., Johnson and Eagly 1989; Sherif et al. 1973), influence their information processing and judgement (Sherif et al. 1965), and guide their behavior (e.g., Fazio and Zanna 1978; Sivacek and Crano 1982).

### **Processes Forming an Attitude**

*Direct experience* is the extent to which an individual's attitude has been formed based on direct behavioral interaction with the attitude object. The underlying rationale is that direct contact and interaction with the attitude object produces attitudes that are more clearly, confidently, and stably held (Regan and Fazio 1977). Direct experience is operationalized with the known groups method (e.g., Regan and Fazio 1977). As an alternative, individuals are asked to report the amount of direct experience they have with the attitude object (e.g., Fazio and Zanna 1978). Attitudes based on direct experience are more persistent (e.g., Doll and Ajzen 1992; Watts 1967), more resistant (Borgida and Campbell 1982; Wu and Shaffer 1987), and stronger guides of behavior (e.g., Fazio and Zanna 1978; Regan and Fazio 1977).

*Elaboration* refers to the amount of in-depth thought devoted by the individual to the attitude object and its properties (Petty et al. 1995). Theoretically grounded in the elaboration likelihood model (ELM) (Petty and Cacioppo 1986), careful and effortful thinking about the attitude object forms attitudes that are stronger compared to attitudes based on simple cues (e.g., situational factors) (Petty et al. 1995). Assessing the thoughts listed by individuals about the attitude object is one operative way to measure the amount of elaboration (e.g., Chaiken 1980). Argument quality manipulations are a further operative measure. Elaboration is thought to be high if strong arguments show a greater effect on the individual's attitude than weak arguments. The underlying rationale is that individuals must have scrutinized the quality of the messages more carefully if they recognize the merits of the high quality argument (e.g., Petty et al. 1976). In self-reports, individuals are asked how much effort they devoted to thinking about the attitude object (e.g., Petty et al. 1977) or report their general need for cognition as a proxy (e.g., Haugtvedt and Petty 1992). Attitudes formed through higher elaboration are more persistent (e.g., Chaiken 1980; Haugtvedt and Petty 1992), more resistant to change (e.g., Haugtvedt and Petty 1992; Haugtvedt and Wegener 1994), and more likely to impact behavior (e.g., Cacioppo et al. 1986; Petty et al. 1983).

### **Strength-Related Attitude Features in IS Adoption**

The review in IS adoption yielded strength-related attitude features in all categories of the present review but aspects of the attitude itself. The following sub-subsections present the identified features by category.

#### **Aspects of the Cognitive Structure**

*Knowledge* is conceptualized in IS depending on the attitude object either as the expertise in technologies that enables an individual to use them (Bhattacharjee and Sanford 2006) or in the more specific context of online shopping as the knowledge a potential buyer has about the products on offer (Huang et al. 2006; Lee et al. 2012). In order to assess knowledge, individuals report the amount they perceive to have (Bhattacharjee and Sanford 2006; Lee et al. 2012) and are sometimes classified additionally in an operative way based on the information they were provided with prior to the assessment (Huang et al. 2006). Attitudes grounded in more knowledge about the attitude object show three quality aspects in IS contexts. First, although only indicated so far, they are more likely to persist over time (Bhattacharjee and Sanford 2006). Second, they are more resistant in the sense that changing them requires high quality arguments, which contain accurate or relevant information about technologies and offered products (Bhattacharjee and Sanford 2006; Huang et al. 2006). Third, they impact an individual's information processing and judgement by inducing a greater commitment toward online sellers (Lee et al. 2012).

#### **Subjective Beliefs**

*Certainty* is the first subjective belief that surfaced in our review in IS. It refers to how confident individuals are in their attitudes toward an IS (Khalifa et al. 2012) or toward specific parts of it like the quality of personalization provided by the IS (Ho and Bodoff 2014). This degree of confidence is measured with self-reports in which individuals express how sure they are about their evaluation of the IS (Khalifa

et al. 2012) or a specific part (Ho and Bodoff 2014). Attitudes held with greater certainty exert a greater influence on an individual's intention to adopt the IS (Khalifa et al. 2012) and are in addition indicated by Ho and Bodoff (2014) as stronger guides of actual system usage behavior.

The second subjective belief, *involvement*, takes several degrees of specificity in IS. In its most general form, it is conceptualized as personal relevance of the attitude object to the individual's needs, values, and interest (Wang et al. 2009). In a more domain-specific way, involvement is put in the IS context as the relevance of an information technology (IT) system to an individual's work (Bhattacharjee and Sanford 2006), the personal relevance of a product or product category to online shoppers (Kwon and Chung 2010), or a motivational state that is reflected by an individual's health situation in case of electronic health records (Angst and Agarwal 2009). Involvement is operationalized in IS by operative means and self-reports. In the former case, existent approaches infer an individual's involvement from the level of involvement typically created by the attitude object (e.g., a product offered online) in individuals (Kwon and Chung 2010) or from an individual's past behavior, for example from how frequently the individual used health services in the past (Angst and Agarwal 2009). In the latter case, individuals report their perceived degree of involvement with attitude objects such as the IT system itself (Wang et al. 2009) or its use (Bhattacharjee and Sanford 2006). Attitudes of involved individuals are indicated to persist over the course of time (Bhattacharjee and Sanford 2006). Whether involved individuals are more resistant to attitude change in IS contexts is to date unclear (Bhattacharjee and Sanford 2006; Kwon and Chung 2010; Wang et al. 2009) and is likely to depend on the specific type of involvement (see Angst and Agarwal (2009) with reference to Johnson and Eagly (1989)) as well as the employed argument quality manipulation (Bhattacharjee and Sanford 2006).

### Processes Forming an Attitude

*Direct experience* refers to the usage experience the individual has with the IS (Karahanna et al. 1999) or IS of similar kind (Yu et al. 2005). It is gauged by capturing the time since the IS in question was introduced (Venkatesh et al. 2003) or with self-reports in which individuals recall since when they are using the IS (Mao and Palvia 2008). Attitudes grounded in rich direct experience with the IS impact IS usage behavior (e.g., Karahanna et al. 1999; Mao and Palvia 2008), but do not always show this effect (e.g., Taylor and Todd 1995b; Venkatesh et al. 2003; Yu et al. 2005). The latest results of Mao and Palvia (2008) suggest that the experience period has to comprise several years in order to show a reliable effect.

*Elaboration* is the fifth and last strength-related attitude feature we identified in our review in IS. It denotes the extent of careful thinking an individual devotes to the IS (Ho and Bodoff 2014) and the fact of having received effortful thought renders the resulting attitude toward the IS strong. Elaboration is measured operatively by counting the thoughts individuals list about the IS. Highly elaborated attitudes show greater persistence over the course of time (Ho and Bodoff 2014).

### Summarizing the Strength-Related Attitude Features in Both Disciplines

The results contain 13 strength-related attitude features across two disciplines. They fall into all four categories of the review, namely aspects of the attitude itself, aspects of the cognitive structure, subjective beliefs, and processes forming an attitude. The following Table 1 summarizes the features based on the review results from each discipline as presented in the previous two subsections.

<b>Table 1. Strength-Related Attitude Features in Social Psychology and IS Adoption</b>		
Feature	Conceptualization in SP	Conceptualization in IS
<i>Aspects of the attitude itself</i>		
Extremity	Extent to which the attitude deviates from neutrality (Krosnick and Petty 1995)	N/A
Intensity	Strength of emotional reactions provoked by an attitude object in an individual (Krosnick et al. 1993)	N/A
<i>Aspects of the cognitive structure</i>		
Accessibility	Strength of the link between an attitude object and its evaluation in memory (Fazio 1995)	N/A

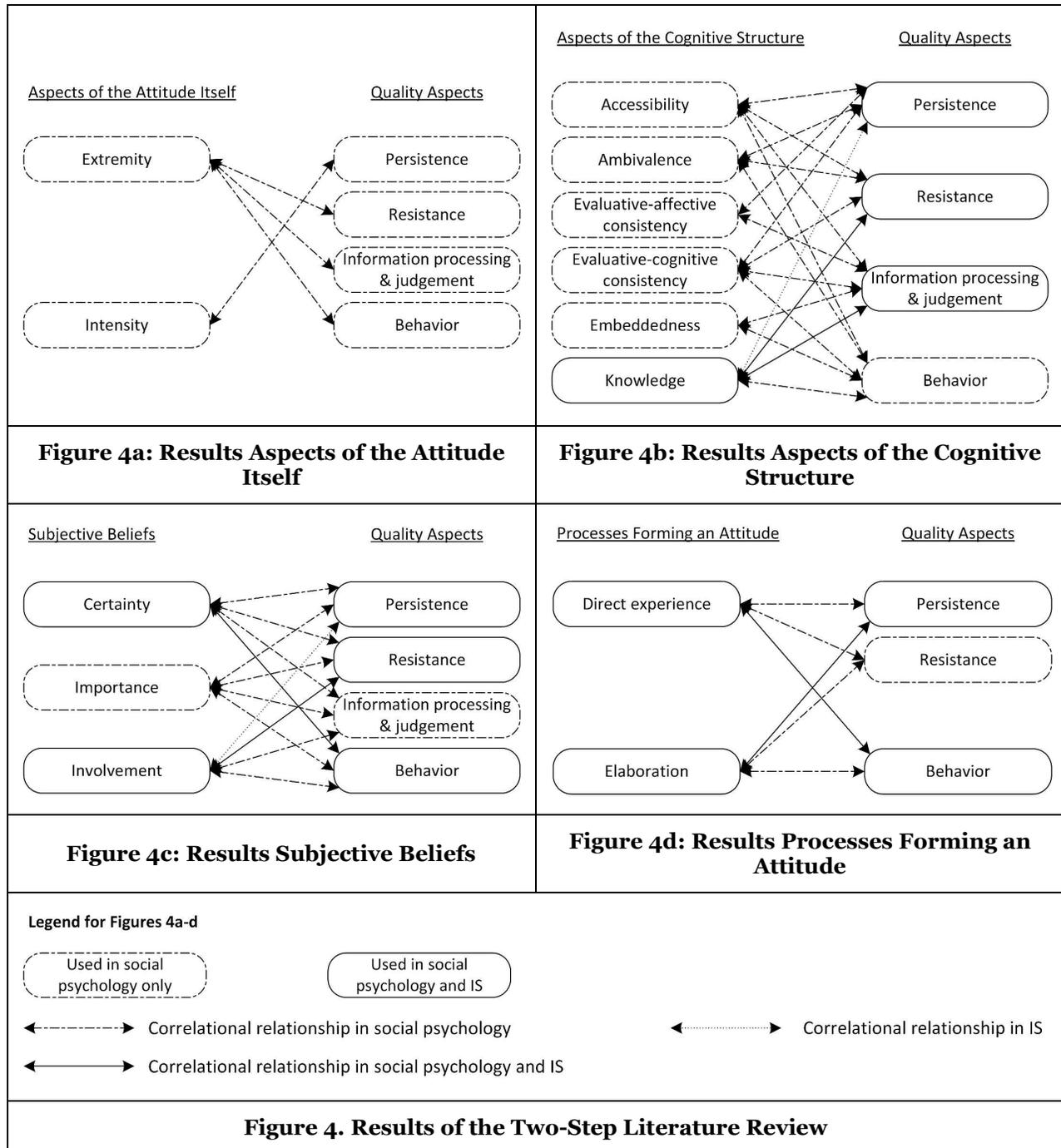
Ambivalence	Degree to which an individual holds positive and negative evaluations of an attitude object (Scott 1968)	N/A
Evaluative-affective consistency	Consistency between an individual's overall evaluation of an attitude object and evaluative aspects of emotions, feelings, moods, sympathetic nervous system activity (Chaiken et al. 1995)	N/A
Evaluative-cognitive consistency	Consistency between an individual's overall evaluation of an attitude object and evaluative aspects of thoughts and beliefs (Chaiken et al. 1995)	N/A
Embeddedness	Degree to which an attitude is connected to other attitudes, beliefs, and values of the individual (Scott 1968)	N/A
Knowledge	Amount of information an individual has about an attitude object and the content of that information (Krosnick and Petty 1995); working knowledge as the information an individual spontaneously retrieves when encountering the attitude object (Wood et al. 1995); objective knowledge as factually correct information (Wood et al. 1995); knowledge about the attitude object in general (Davidson et al. 1985)	Expertise in technologies that enables an individual to use them (Bhattacharjee and Sanford 2006); knowledge about the products on offer in an online shopping context (Huang et al. 2006; Lee et al. 2012)
<i>Subjective beliefs</i>		
Certainty	Subjective sense of conviction or validity individuals have about their attitudes (Gross et al. 1995)	Confidence individuals have in their attitudes toward an IS (Khalifa et al. 2012) or toward the quality of personalization provided by the IS (Ho and Bodoff 2014)
Importance	Degree of concern, caring, and significance individuals attach to their attitudes (Boninger et al. 1995)	N/A
Involvement	Degree to which an individual's attitude is associated with the individual's self-concept (Johnson and Eagly 1989); link of an attitude with an individual's values, with the impression an individual makes on others, or with outcomes desired by an individual (Johnson and Eagly 1989); vested interest as relevance of an attitude object to personal consequences (Crano 1995); issue involvement as the personal importance of an attitude object to an individual's self-concept (Petty and Cacioppo 1979)	Personal relevance of the attitude object to an individual's needs, values, and interest (Wang et al. 2009); relevance of an IT system to an individual's work (Bhattacharjee and Sanford 2006); personal relevance of a product or product category to online shoppers (Wang et al. 2009); motivational state that is reflected by an individual's health situation (Angst and Agarwal 2009)
<i>Processes forming an attitude</i>		
Direct experience	Extent to which an individual's attitude has been formed based on direct behavioral interaction with the attitude object (Regan and Fazio 1977)	Usage experience an individual has with the IS (Karahanna et al. 1999) or IS of similar kind (Yu et al. 2005)
Elaboration	Amount of in-depth thought devoted by the individual to the attitude object and its properties (Petty et al. 1995)	Extent of careful thinking an individual devotes to the IS (Ho and Bodoff 2014)

## **Discussion and Propositions for Research on IS Adoption**

While the presented strength-related attitude features answer our first and second research question, that is which features indicate respectively strong attitudes in social psychology and IS adoption, it is so far unclear which opportunities they imply for explaining when attitudes guide IS adoption behavior. We thus discuss the extent to which IS adoption research considers the features next and integrate knowledge from social psychology and IS adoption in a framework of attitude strength in IS adoption.

### The State of Attitude Strength Consideration in IS Adoption

Comparing the review results, the strength-related attitude features appear largely unexplored in IS adoption (see Figure 4a-d for the results by feature category). Despite their crucial role as the indicators of an attitude's quality, only five out of the known 13 features are employed in IS adoption so far.



More specifically, aspects of the attitude are not considered at all in IS adoption (see Figure 4a) and knowledge is the only aspect of the cognitive structure that is used (see Figure 4b). Further, with certainty and involvement, two subjective beliefs receive attention in IS adoption, but are related to a limited number of the known associated quality aspects, and the third feature, importance, is currently not taken into account in spite of its relationship with all four quality aspects in social psychology (see Figure 4c).

Direct experience and elaboration, the two processes forming an attitude, respectively indicate an attitude's impact on behavior and its persistence in IS adoption, but each is related to one out of the three known associated quality aspects (see Figure 4d).

The large difference in the degree of the strength-related attitude features' application appears to originate from the different foci of the respective disciplines. Social psychology focuses on attitude as one of its core concepts (Eagly and Chaiken 1993) and inconsistent findings thus naturally stimulated a better understanding of the forces behind, as in case of the attitude strength concept (Krosnick and Petty 1995). In IS adoption, by contrast, mixed results on attitude as an adoption determinant suggested that it may be parsimonious to omit attitude from further developments of the TAM and related models (Davis et al. 1989; Venkatesh et al. 2003) and research put an emphasis on alternative explanations by highlighting, for example, the importance of beliefs (e.g., Koufaris 2002; Venkatesh and Davis 2000). A further possible reason is that a literature review like ours cannot rule out the possibility that more features have been investigated in IS adoption already, but turned out insignificant and the results were thus not reported in the literature. However, based on the work our literature review could identify and the potential of every feature to explain unique variance in attitude strength (Krosnick and Abelson 1992; Krosnick and Petty 1995; Visser et al. 2006), the large difference suggests a considerable unexplored potential the features also hold in IS adoption. Despite the large difference in the degree of application, the existing knowledge on the strength-related attitude features that are applied in both disciplines is largely consistent. The conceptualizations of the features in IS adoption are close to their counterparts from social psychology, although of course adapted to the specific context of IS. For example, the IS or using the IS becomes the attitude object about which an individual possesses knowledge (e.g., Bhattacharjee and Sanford 2006). In order to measure these features, IS adoption employs operative means and self-reports. Thought listings, for instance, indicate an individual's amount of elaboration about the IS (Ho and Bodoff 2014) and self-reports are used as efficient means for considering the features within an IS adoption context (e.g., Khalifa et al. 2012). Regarding the indication of strong attitudes, the features' relationships with the four quality aspects of strong attitudes are largely in line with the ones established in social psychology (see Figure 4a-d). For example, attitudes held with greater certainty are stronger guides of IS adoption behavior (e.g., Khalifa et al. 2012). The relationships of knowledge and involvement to persistence, however, appear at first unique in IS adoption (see Figure 4b-c), but they are consistent with the relationship between elaboration and persistence (see Figure 4d) if knowledge and involvement are framed within the ELM as indicators of subsequent elaboration like Bhattacharjee and Sanford (2006) do. The results on two relationships associated with involvement and direct experience are mixed in IS adoption, but recent findings suggest the importance of considering the type of involvement (Angst and Agarwal 2009) and amounts of experience (Mao and Palvia 2008).

### ***Toward a Holistic View on Attitude Strength in IS Adoption***

Alike in social psychology, strength-related attitude features relate in IS adoption to all four quality aspects of strong attitudes. This raises the question of when which feature is relevant. Based on (a) the definition of strong attitudes, (b) our two-step literature review on strength-related attitude features, and (c) the nature of IS adoption, we derive the following four propositions:

The first proposition builds on the fact that IS usage itself is a behavior. The behavior of using an IS (e.g., Venkatesh et al. 2003) or the intention to do so (e.g., Hsieh et al. 2008) are the primary dependent variables in IS adoption models (Jeyaraj et al. 2006; Sun and Zhang 2006). They correspond in their behavioral character with overt behavior (e.g., Fazio and Williams 1986) and behavioral intention (e.g., Armitage and Conner 2000), which are variables strong attitudes impact in social psychology. The present review highlights strength-related attitude features that explain this impact. Existent IS research already shows, that the more certain individuals are in their attitudes toward IS, the higher is this attitude's predictive validity on behavior (Ho and Bodoff 2014).

*P1: The strength-related attitude features identified in this review as indicators of an attitude's impact on behavior strengthen an attitude's explanation of individual IS adoption behavior directly.*

Although less frequently subject to investigation, one attitude exerts an indirect influence on IS adoption behavior through other attitudes or psychological concepts other than attitude. For instance, with respect to different attitude objects (and thus different attitudes), attitude toward using the system mediates the influence attitude toward the system itself has on system usage (e.g., Zhang et al. 2008), and satisfaction,

as attitude-related concept (cf. Bhattacharjee 2001), mediates the influence of attitude on IS usage in some studies (e.g., Amoroso and Cheney 1991). Among several relationships between a strong attitude and other psychological concepts like categorization (Smith et al. 1996), social psychology investigated the relationship between different attitudes and finds their relationship to be explained by strength-related attitude features (Prislin and Ouellette 1996). Basing on these findings, we propose that strength-related attitude features indicate information processing and judgment related to the mediating effect that (a) further attitudes and (b) psychological concepts other than attitude have on the attitude-behavior relationship in IS adoption. In the case of (b), for example, it is conceivable that higher knowledge enables individuals to make a greater commitment toward an online seller based on their attitudes as shown by Lee et al. (2012), and that a greater commitment in turn has a greater impact on the intention to continue using this seller's online store similar to the findings by Malhotra and Galletta (2005).

*P2a: The strength-related attitude features identified in this review as indicators of an attitude's influence on information processing and judgment strengthen an attitude's explanation of individual IS adoption behavior indirectly via the attitude's influence on further mediating attitudes.*

*P2b: The strength-related attitude features identified in this review as indicators of an attitude's influence on information processing and judgement strengthen an attitude's explanation of individual IS adoption behavior indirectly via the attitude's influence on further mediating psychological concepts.*

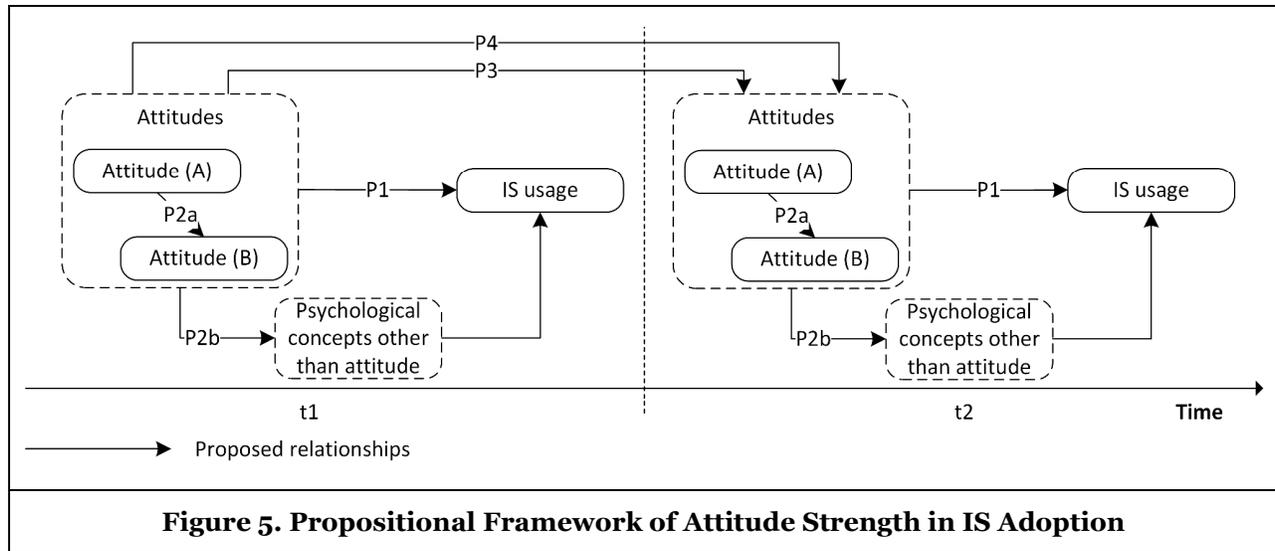
IS usage behavior is the dependent variable of IS adoption research not only at one point in time  $t_1$ , but also in the sense of continued usage at a second point  $t_2$  (e.g., three months later) (Bhattacharjee and Premkumar 2004). Whether the attitude from  $t_1$  is still the same at  $t_2$  and more importantly why illuminates the forces at work within this timespan, which would otherwise stay a black box. Research in social psychology highlights strength-related attitude features which explain why an attitude persists over such a timespan of about an hour to up to nine months (Doll and Ajzen 1992; Krosnick 1988a) or changes in the meantime. Hence, we propose that features known in social psychology to indicate this persistence contribute to the explanation of IS usage behavior in longitudinal IS adoption contexts. The more individuals think about the IS, for example, the more well-elaborated their attitudes are and the more likely they persist between different usage time points (Ho and Bodoff 2014).

*P3: The strength-related attitude features identified in this review as indicators of an attitude's persistence strengthen an attitude's explanation of individual IS adoption behavior indirectly by explaining an attitude's persistence in longitudinal contexts.*

An attitude does not exist unchallenged in IS adoption contexts, but is sometimes subject to persuasive messages that aim at changing the attitude in order to induce an IS usage behavior at a later point in time  $t_2$  that is different from the one presumably caused by the currently existing attitude at  $t_1$  (e.g., Angst and Agarwal 2009). Strength-related attitude features from our review explain if an attitude resists such persuasion attempts, and if not, in which way the attitude will be changed. They do so across a broad range of contexts, for example in case of attitudes toward consumer products (Haugtvedt and Petty 1992). In the light of their wide applicability and because of the fact that much IT is sold nowadays as consumer products, we propose the features as indicators of an attitude's resistance in IS adoption contexts. Attitudes backed by larger amount of knowledge, for example, show greater resistance to persuasive messages in the sense that it requires stronger message arguments to change them (Huang et al. 2006).

*P4: The strength-related attitude features identified in this review as indicators of an attitude's resistance strengthen an attitude's explanation of individual IS adoption behavior indirectly by explaining if and how the attitude will change in reaction to persuasion attempts.*

P1 and P2 propose the strength-related attitude features that explain the impact of attitudes on IS usage at one point in time directly (P1) and indirectly via mediating attitudes toward different objects such as an object B (P2a) as well as psychological concepts other than attitude (P2b). P3 and P4 propose the features that explain the attitudes' durability between two points in time  $t_1$  and  $t_2$ , be it without external influences (P3) or in the face of explicit attacks (P4). This durability in turn is relevant to the attitudes' impact on IS usage at the second point in time  $t_2$ , at which the attitudes exert their influence again according to P1 and P2. Given that the majority of the features is to date unexplored in the context of IS adoption and holds the potential to explain unique variance in attitude strength, the propositions outline various new opportunities for future IS adoption research to benefit from the durability and impactfulness of attitudes based on the features, and thus answer our third research question. Figure 5 depicts the framework.



While the framework intends to provide a comprehensive view on attitude strength in IS adoption, the reviewed empirical work typically focuses on one proposition at a time in one research model, for example by employing the certainty feature as a moderator of the relationship between attitude and intention to adopt the IS (Khalifa et al. 2012), which is in line with P1. It is, however, also conceivable to investigate multiple propositions in one model. For example, Angst and Agarwal (2009) investigate how involvement relates to the resistance of attitudes in line with P4 by relating at t2 involvement to attitude while controlling for the influence of the attitude from t1. They further relate the attitude at t2 to the intention to adopt the IS at t2. In order to illustrate how this model can also consider P1, the certainty moderator from the previous example could be added to the attitude-intention relationship at t2.

## Conclusion

In conclusion, the strength-related attitude features lay the foundations for distinguishing strong attitudes from weak ones in IS adoption, that is distinguishing which attitudes determine IS usage and which do not. Toward this conclusion, we opened the black box of attitude strength in IS adoption by first introducing the concept of attitude strength and reviewing knowledge on its foundations in terms of strength-related attitude features in social psychology and IS adoption. A subsequent comparison of the knowledge in both disciplines highlighted that IS adoption barely draws on the potential strength-related features offer and the features were situated and combined in a propositional framework for distinguishing impactful and durable attitudes in IS adoption. We thereby contribute to one of the current frontiers in IS adoption at which research is concerned with the circumstances under which attitudes explain IS usage. The framework is meant to serve as a starting point toward using the full potential of the attitude concept that early attitude theorists such as Allport (1935) once envisioned. We invite future research endeavors to identify the strength-related attitude features that match their general IS adoption context with the help of our literature review and framework, and encourage a subsequent fine-grained selection of the features based on their theoretical links to the particular aspect of IS adoption under investigation, such as suggested by Bhattacharjee and Sanford (2009).

In spite of its contributions, our paper has to be viewed within its limitations. First, we drew on meta-analyses and reviews as a starting point for the review on strength-related attitude features in social psychology. This enabled identification and comparison of established knowledge from the attitude concept's root discipline, which showed many facets since the 1950s. However, it does not exclude the possibility that our paper misses a specific feature beyond the 13 identified ones that might turn out valuable for IS adoption research in the future. Second, out of the 40 journals of the two-step literature review, we had limited access to two of them. More specifically, the sample from the *Journal of Computer Information Systems* includes the timeframe from 1997 onwards and the sample from the *Journal of Global Information Management* considers articles up to and including 2012.

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