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Understanding Frontline Problem-solving Dynamics Using Video Recordings of Service Failure Interactions

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Report Summary

Frontline problem-solving interactions are a source of strategic differentiation and competitive advantage as evidenced by the enduring reputation of consistently recovering, sometimes even delighting, dissatisfied customers that companies such as Southwest, Ritz-Carlton, and Nordstrom have acquired in their respective industries.

While research has focused on customer states before and after frontline interactions, customer-agent dynamics *during* problem-solving interactions have received little attention. Our understanding of what occurs in problem-solving interactions that is critical for service failure recovery is, at best, limited. In this study, Jagdip Singh, Detelina Marinova, and Sunil Singh examine the language of face-to-face frontline problem-solving interactions and how it influences customer satisfaction in real time.

Specifically, they categorize frontline employees' verbal and nonverbal cues into distinct dimensions of frontline *solving* and *relational* work. Based on video recordings of service failure interactions from the reality television series "Airline" (U.K. and U.S.), they examine the dynamic (time-varying) influence of frontline employees' *solving* and *relational* work as well as their displayed affect on customer satisfaction (CSAT).

They find that frontline solving work not only has a positive effect on CSAT, but that this effect *increases* in magnitude during the problem-solving interaction. This influence on CSAT remains significant even when service recovery is not feasible, suggesting that customers value the problem-solving process independently from the outcome, and recognize frontline agent efforts in developing solution options.

The authors also find that the positive association between frontline solving work and CSAT becomes *weaker* for relatively higher levels of frontline relational work or displayed affect, and *stronger* for relatively lower levels of relational work or displayed affect over time.

Based on these findings, Singh, Marinova, and Singh suggest that common service scripts of frontline employees' relational work (e.g., empathy) and displayed positive affect (e.g., smiling) might be less helpful, even dysfunctional, in problem-solving interactions. Instead, customers reward problem-solving competence of frontline agents that is focused on generating solutions even when they are insufficient to fully recover service failures.

In addition, the authors develop a library of validated dictionaries for frontline problem solving in service contexts which managers can use for cue-based training of frontline agents and for seeding an automated system for dynamic and live frontline assistance.

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Frontline interactions represent a critical element of organization-customer connectivity where an organization's customer facing employees interact with customers to solve problems, configure solutions, co-produce innovations or share information. While engagement of customers is a crucial "hallmark" of a customer-centric culture (Vargo and Lusch 2004; Ramani and Kumar 2008), individual customer interactions are the means of molding customer experiences (Verhoef et al. 2009). Recent research highlights the central role of frontline interactions in shaping organizational outcomes such as customer satisfaction (henceforth, CSAT), loyalty, and brand identity (Ma and Dubé 2011; Sirianni et al. 2013).

In this study, we focus on face-to-face frontline problem-solving interactions. Problem-solving interactions require frontline employees (henceforth, FLEs) to respond to anticipated, identified, or reported customer concerns and complaints that are often emotionally charged. Organizations have to staff, train and empower frontlines to empathetically understand customer problems, competently develop customized solutions, and use the complaint as an opportunity to repair, recover and recharge customer relationships. Customers who complain view a problem-solving interaction as a critical event that often leaves an enduring memory trace, use it to calibrate the relationship with the provider, and as a call for further action to remain loyal or switch contingent on problem solving. Evidence for the impact of problem-solving interactions can be found in the high satisfaction ratings obtained by organizations such as Southwest, Ritz-Carlton and Nordstrom year after year (ACSI 2014). Southwest designs and implements its training and coaching via problem-solving approaches rather than disciplinary actions (Gittell 2003). Nordstrom on the other hand allows its frontline staff the flexibility to use judgment while resolving customers' problems (Spector and McCarthy 2005; Tax, Brown, and Chandrashekaran 1998). Thus, if appropriately leveraged, problem-solving interactions can become a source of strategic differentiation and competitive advantage for organizations.

Importantly, much past research has tended to examine either the payoffs from organizational problem-solving investments (e.g., empathy, compensation; Liao 2007; Smith and Bolton 1998) or functionality (e.g., capability, resources; Williams and Spiro 1985; Streukens and Andreassen 2013). In contrast, there has been a limited focus on the communication processes *during* frontline interactions (for exceptions Dietz, Pugh, and Wiley 2004; Ma and Dubé 2011). An essential aspect of problem-solving interactions is the language--verbal cues and nonverbal cues that FLEs and customers use as they collaborate (or not) to understand problems and construct mutually satisfying (or not) solutions. Despite repeated calls by researchers to study both problem solving structures and processes (Bonoma and Felder 1977; Stewart, Hecker, and Graham 1987; Sundaram and Webster 2000), empirical work has overlooked the study of frontline problem solving processes and the insights it offers.

We address the preceding gap by examining the language of face-to-face frontline problem-solving interactions, and how it influences CSAT in real time. The language of frontline interactions involves audible words (i.e., verbal) and bodily cues (i.e., nonverbal) that are interrelated over time in a dynamic process of problem-solving. Verbal cues are primarily rooted in linguistics theory emphasizing the functional meaning of the language and communicate frontline action and competence in problem solving. Nonverbal cues involve body posture, gestures, facial expressions and eye movements that communicate positive or negative affect during frontline problem solving (Sundaram and Webster 2000). While these language elements are well recognized, studies that examine how language unfolds *during* the problem-solving interaction, and which patterns relate to effective problem-solving and why, are few if any.

Contributions

This study makes five contributions. First, we conceptualize and empirically isolate the dynamic and interactive influence of FLE's work and displayed affect on CSAT as the interaction unfolds over time. We take a behavioral approach to conceptualize frontline work and displayed affect constructs from *in-situ* video-recordings of problem solving interactions. Second, we develop a novel methodology for the study of FLEs' verbal and nonverbal cues that includes (a) conceptualizing solving and relational work as separate dimensions of frontline work that customers infer from *verbal* cues, and (b) isolating the distinct facial, body and gestural cues that convey displayed affect from *nonverbal* cues during problem solving. Specifically, we develop and validate dictionaries of distinctive verbal cues for FLE solving and relating work, and nonverbal cues for FLE displayed affect that can be used broadly for the study of frontline problem solving. Third, we find that frontline *solving work* not only has a positive effect on CSAT, but that this effect *increases* in magnitude *during* the problem solving interaction. Fourth, we find that influence of frontline solving work on CSAT remains significant even when service recovery is *not* feasible. This indicates that customers can separate problem solving *process* from solution *outcome* and value frontline agent efforts in developing solution options.

Fifth, the positive association between frontline solving work and CSAT becomes *weaker* for relatively higher levels of frontline relational work or displayed affect, and *stronger* for relatively lower levels of relational work or displayed affect over time. Thus, overdoing relational work and/or positive displayed affect has counter-productive effect in problem solving interactions.

Conceptual Development and Hypothesis

Nature of frontline problem-solving interactions

Frontline problem-solving interactions are prompted by dissatisfied customers seeking redress to encountered problems or noncompliant customers who violate rules/regulations. They have several unique features. First, problem-solving interactions cannot be easily scripted and often involve on-the-spot improvisation to address customers' specific problems (Heritage and Maynard 2006). Second, problem-solving interactions are often emotionally charged by customer anger and frontline frustration (Maxham III and Netemeyer 2002), which increase the potential for miscommunication and misperception (Groth and Grandey 2012). Third FLEs have to draw from a wide repertoire of skills to resolve customer problems. Fourth, customers view problem-solving interaction as a critical event that leaves an enduring memory trace, and use it to calibrate and adjust their relationship with the provider (Bitner, Booms, and Mohr 1994). Thus, problem-solving interactions are uncertain, salient, emotionally charged and demand superior frontline capabilities. Not surprisingly, leading companies invest significant resources to get customer problem-solving right (Spector and McCarthy 2005).

Problem-solving interactions also involve distinctive activities. Sometimes referred to as phases in the literature, activities are qualitatively different functions that are typically performed in problem-solving interactions. Bales and Strodtbeck (1951) described *orientation* (e.g., sharing information to address uncertainty), *evaluation* (e.g., developing and accessing solutions) and *control* (e.g., asserting specific solution) as distinct activities that occur consistently in non-organizational problem-solving teams (e.g., chess problem-solving). In marital conflict interactions, Gottman (1979) found that *agenda building* (e.g., expressive feelings, verbalizing), *arguing* (e.g., defending, disagreeing and directing) and *negotiating* (solving, summarizing) constitute problem-solving activities. Likewise, in doctor-patient interactions, Maynard and Hudak (2008) suggest that *specification* (e.g., assessing patient's needs), *assessment* (e.g., personalizing care to match patient's needs), and *delivery* (e.g., outline details of care regimen) occur frequently as three distinct phases.

Based on the preceding, we propose "Sensing—Seeking—Settling" as activities that FLEs perform during customer problem-solving. *Sensing* is gaining comprehension of the problem including its nature, significance, and consequence for customers (Brashers, Goldsmith, and Hsieh 2002). *Seeking* is generation of ideas and possibilities for problem solving, typically through FLE competence, ingenuity, and improvisation, although customers often join in a collaborative process that allows for objections and joint solution identification (Koenig Kellas and Trees 2006). *Settling* seeks closure by clarifying, confirming, and carrying out an emergent solution and, if necessary, re-examining or re-creating alternatives (Kieren, Maguire, and Hurlbut 1996). Following past studies, we expect that these activities have fuzzy boundaries such that they are neither neatly demarcated nor orderly sequenced in problem-solving interactions (Raush, Barry, Hertel, and Swain 1974); nevertheless, there is an evident progression from sensing toward settling as problem-solving interactions unfold.

Frontline role dimensions and problem-solving work

A role consists of a set of socially constructed expectations (e.g., rules or norms) held by the sender and receiver about behaviors enacted in interpersonal interactions. Role theory asserts that individuals often rely on role expectations to guide behaviors, just as organizations codify role expectations as scripts to ensure that employees execute desired behaviors (Solomon et al. 1985). In service recovery context, Liao (2007) outlined role expectations of FLEs to include *instrumental*—prompt handling, providing explanation, resolving concerns, and *relational* dimensions—listening, apologizing, helping and being courteous). Likewise, Van Dolen, De Ruyter, and Lemmink (2004) identified skill- (e.g., competence) and interaction-specific behaviors as frontline role dimensions. In a detailed analysis of frontline work, Bradley et al. (2013) categorized a wide range of frontline behaviors into two well differentiated role dimensions corresponding to task—focused on core service to customers (e.g., competence), and relational—focused on the emotional relationship with customers (e.g., empathy)[1].

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[1] Bradley et al. (2013) also identified a third category: self to reference behaviors that relate to the actor's own goals, needs and interests. Because we are not examining the effect on FLEs due to behaviors displayed by them, we do not include it for consideration here.

Building on role theory perspective on frontline work, we define frontline work to include: (a) FLE ***solving work-*** as relating to competence (e.g., knowledge, skills) and action orientation (e.g., engaged, proactive) in effective problem solving, and (b) FLE ***relational work*** as relating to compassion (e.g., empathy, caring) and agreeableness (e.g., courtesy, respect) in effective customer bonding.[2] Research and anecdotal evidence suggests that FLEs usually blend solving and relational roles in service interactions.

Roles guide but do not determine behaviors. Individual FLEs use discretion and mindfulness to enact behaviors that may deviate from, extend prevailing role expectations, or creatively construct new behavioral patterns (Coelho and Augusto 2010). As such, it is important to distinguish between role *expectations* as coded in norms and rules, and *behaviors* as enacted in-situ; the latter we refer to alternatively as *work*[3]. Because enacted behaviors are observable, indicate employee agency and effort (e.g., engaged or disengaged), feed customer inferences about employee intent (e.g., helpful or not helpful), and serve as an input to customer response (e.g., satisfied or dissatisfied), they are key to understanding customer outcomes in service interactions (Bradley et al. 2013). Thus, instead of accessing what FLEs are thinking or intending to do, we focus on the work FLEs do during customer interactions as evident by displayed behaviors. Consequently, our conceptual development and hypotheses relate to solving and relational work executed by FLEs during problem-solving interactions with customers.

Frontline problem-solving work and CSAT

Organizations develop detailed scripts and routines to direct FLE attention and action for effective solving work. For customers, FLE actions provide clues to infer their competence in problem-solving. Inferred competence is important in assuring customers that their problem is likely to be resolved effectively, which motivates a cooperative attitude toward the FLE (Groth and Grandey 2012). Verbal cues, including words and phrases that FLEs use to seek information, communicate different options, and/or explain a solution to a customer, are input in customer's

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[2] Both compassion and agreeable have a rich history in psychology and focus on individuals' pro-social and communal behaviors displayed during interpersonal interaction. These broad categories include empathy, caring, attentiveness, courtesy and respect among other relational behaviors. Compassion and agreeable have been subject to detailed lexical analysis making them suitable for our study.

[3] In a recent special issue, Okhuysen et al. (2013) note that the notion of *work*—defined as "what people do in organizations"—is useful for developing and integrating theories that have a behavioral focus and are contextualized within organizations. This is certainly relevant for problem-solving work discussed here.

inferences about FLE competence in solving work. Rhetorical scholars have shown that vocabularies of actors in social communications are powerful mechanisms of influence and inference (Loewenstein, Ocasio, and Jones 2012). For instance, Jones and Livne-Tarandach (2008) analyzed vocabularies of architects interacting with customers to identify variations in professional competence and found that use of words from a professional logic vocabulary (e.g., firms, practice, quality, lasting) enhanced the likelihood of wining projects compared to use of words from a business logic vocabulary (e.g., client, user, works, needs). In the context of customer service call centers, Sturdy and Fleming (2003) show that organizations actively train FLEs for "verbal labor" in talking to customers by emphasizing a service vocabulary of words that promote positive customer inferences and outcomes. No study to date has examined a vocabulary for effective problem-solving words that carry inferences of FLE competence.

We theorize that, at any point in the interaction (***t***), change in CSAT is proportional to the degree to which frontline solving work has been effective at time ***t*** to reduce customer discrepancy. Support for this comes from theories of goal-directed behavior and pursuit that explain why progress toward goal attainment evokes positive feelings and a sense of anticipatory fulfillment. Using self–regulation principles, Carver and Scheier (1990) argued that individuals in motivated goal pursuit continuously monitor their present situation at any time (t) relative to an internal standard of expected discrepancy reduction at that point in time t. When discrepancy reduction is lower than this standard, the monitoring feedback loop engenders frustration and dissatisfaction; conversely, when it exceeds the standard, the feedback loop creates positive and satisfying feelings. The self-regulation mechanism also tracks the rate of discrepancy reduction in goal pursuit which evokes anticipatory feelings of satisfaction (or dissatisfaction). Thus, the monitoring feedback is sensitive to both the level of discrepancy reduction at a given time (***t***) and its trajectory given the time invested in goal pursuit (Fishbach and Finkelstein 2012).

A problem-solving interaction differs from self-regulated goal pursuit because (a) while the customer's *goal* is to resolve a pressing problem, (b) it is the FLE's *actions* that primarily generate problem solutions (discrepancy reduction or recovery) with (c) customer in a supportive (cooperative) role. The separation of goals and actions in problem-solving interactions parallels the phenomenon of "outsourced" self-regulation in interpersonal contexts (Converse and Fishbach 2012; Fitzsimons and Finkel 2011). Specifically, goal pursuit is sourced out to "instrumental others" (e.g., partners/friends) who help the individual by providing effort and/or resources (e.g., actions) that facilitate goal pursuit and attainment. Importantly, customers seeking solutions to experienced problems are *socially distant* from the FLE, and the regulatory help they seek is based on FLE's *in-role expectations*.

Bringing together goal-action separation and FLE's in-role expectations, we theorize that customers with problem solution goals will actively regulate FLE's solving work to ensure that "outsourced" actions are moving positively toward goal attainment. To do so, customers draw inferences from cues in FLE's verbal language about what they are checking, doing and/or offering to assess the level of discrepancy reduction achieved at any given point in the problem-solving interaction (***t***), and the progress toward the goal of problem solution. Customer dissatisfaction is likely to grow when the verbal cues indicate that the FLE's solving work is ineffective in discrepancy reduction, and the progress toward problem solution is slow. Opposite outcomes of increasing CSAT are expected when FLE's solving work is effective in discrepancy reduction and problem solution.

We further specify how FLE solving work dynamically influences CSAT during a problem-solving interaction. Sensing activities that occur early in customer interactions usually involve FLE gathering information to understand the nature of customer problem (Bitner et al. 1990). From a customer perspective, sensing does little to signal how or how fast the problem will be resolved. As such, customer's regulatory feedback indicates that the "instrumental other" has made little progress towards discrepancy reduction and, as a result, customer dissatisfaction is expected to remain largely unaltered. Progress towards discrepancy reduction is discernible during seeking activities when the FLE focuses on generating feasible options that address the customer problem. In so doing, the FLE often communicates with the customer to seek additional information needed to construct relevant options, outline options, and explore customer flexibility in accepting different options. In accord with outsourced regulation theory, customers actively monitor these verbal cues to infer FLEs' effort in problem-solving, and progress toward the goal of problem solving. Compared to sensing work, customers discern positive progress in goal pursuit when seeking work is effective and are expected to evidence a positive change in their satisfaction level. Finally, during settling activities, FLEs focus on communicating one or more solutions, respond to objections by refining/reworking solutions, and implementing the agreed-to solution with efficiency. The concreteness of the solution(s), incorporation of customer input, and alacrity of solution implementation provides customers with tangible evidence of progress toward problem solution. Thus we posit:

H1: FLE's solving work will exhibit an increasingly positive effect on CSAT during a problem-solving interaction.

Relational work moderates the influence of solving work on CSAT

Scholars and practitioners alike have long recognized the positive role of relational work in promoting effectiveness of FLE's solving work (Hart, Heskett, and Sasser Jr 1989; Smith, Bolton, and Wagner 1999). Fang, Lou and Jiang's (2013) study locates relational work in FLE's use of apology in service failure situations since it "conveys politeness, courtesy, concern, effort, and empathy to customers." In a similar vein, Gelbrich and Roschk (2011) identify FLE behaviors including "empathetic, friendly and responsible," among others, as comprising relational work in complaint handling. While relational work does not directly solve customer problems, studies assert that relational work enhances the effectiveness of FLE efforts in working out solutions due to adaptive role of prosocial behaviors in interpersonal communications. Prosocial behaviors cue customers that FLEs understand their problem (e.g., "stand in their shoes"), and ostensibly interested in resolving their problem. In practice, prosocial training is a standard script for agents with problem-solving roles at leading service organizations. For instance, in the airline industry, the training mantra appears to be that "if you don't apologize and don't make customers know you care, it's very difficult to recover the customer afterward [from dissatisfaction]" (Stoller 2005).

However, countervailing perspectives on the role of relational work have persisted in the literature providing alternative explanations to the prosocial effect assertions. For instance, Menon and Dubé (2007) argue that while relational work is beneficial in service interactions where the customer's goal is to enjoy service experiences (e.g., pleasant hostess while flying), it is less useful in situations where the customer's goal is to obtain satisfactory solution to a service problem causing an unexpected, and often intolerable, inconvenience. Here, customary and desirable relational actions such as "small talk" (e.g., how are you today?) and "happy talk" (e.g., have a nice day) are likely to be construed as insensitive by customers suffering from an unexpected problem. Thus, relational work can trigger contrast effects between customers' expectations that the FLEs focus their effort on speedy problem solving (solving work) on one hand and FLE actions to engage in "small" and "happy" talk (relational work) on the other.

In a classic study of contrast effects, Rafaeli and Sutton (1987) found that the relationship between store sales and FLE's emotional work—captured by relational actions such as greeting (e.g., how are you today?) and thanking (e.g., thank you), among others—was moderately but significantly negative. These authors traced the root of this negative relationship to the observation that, under time pressure when the store is busy with long lines, positive displays of emotional (relational) work are counterproductive by frustrating customers who leave without completing their shopping. This finding has been reproduced. In an experimental study, Menon and Dubé (2007) found that customers, who were anxious for missing their flight due to long check-in line, evaluated service outcome higher when the FLE behaviors focused on *instrumental* actions (solving work in our study), and relatively *lower* when FLEs also engaged in *emotional* work (relational work in our study) along with solving work. Thus, while low levels of relational work may be effective in facilitating solving work, moderate or high level of relational work induce contrast effects when customers experience service related problems.

Based on the preceding, we hypothesize that FLE relational work will negatively moderate the effect of FLE's solving work on CSAT, such that this negative effect grows in significance (more negative) as the problem-solving interaction advances. During sensing, FLE relational work may include empathetic talk (e.g., "I understand," or "I am sorry") that customers perceive as customary and reasonable to facilitate solving work. As such, subdued relational work is likely to enhance the efficacy of solving work although vigorous relational work involving small and happy talk (e.g., how are you doing today," how is the day so far," "it's freezing today") are unlikely to be helpful. Seeking requires FLEs to find feasible options for customer's problem. Customer vigilance on FLE actions to focus on solving and intolerance for distraction is likely to narrow the range of acceptable relational work. Even moderate levels of relational work (e.g., repeatedly apologizing, engaging in non-problem-solving topics, constantly expressing empathy) are likely to raise customer's regulation concerns about timely progress toward the goal of effective problem solving. Consequently, the negative moderating effect of relational work is likely to increase in the seeking relative to sensing phase. In the final phase, settling requires FLEs to not only negotiate a satisficing solution for the customer but also implement it in practice. As the crux of solving work, effective settling is expected to be dominated by FLE working out the details of the problem solving, adapting it to customer objections and, executing the solution with minimum delays. Attention to detail, focused action, and completeness in solving work are prominent in this phase. Together, the emphasis on solving work in the settling phase is likely to crowd out the need and tolerance for FLE effort expended in relational work. Thus, we posit:

H2: *FLE's relational work will exhibit an increasingly negative moderating effect on the influence of solving work on CSAT during a problem-solving interaction.*

Affect moderates the influence of solving work on CSAT

Face-to-face interactions are rich with nonverbal cues that carry nontrivial influence in social exchanges (Mehrabian 1969; Stewart et al. 1987). Interest in studying nonverbal cues for effective customer engagement can be traced to Bonoma and Felder's (1977, p. 179) who emphasized its promise in examining "naturalistically occurring" buyer-seller interactions. For these authors, nonverbal cues such as kinesics (e.g., body movements—smiling, nodding, eye contact), proxemics (e.g., social/personal distance), and haptics (e.g., touch) are as, if not more, prevalent and salient than verbal cues in interpersonal interactions. They argued that studies of social influence will be incomplete without including a coherent account of nonverbal cues. Despite significant empirical challenges, marketing researchers have successfully examined nonverbal cues in variety of settings including salespeople's client presentations (Leigh and Summers 2002), salesperson training (Peterson 2005), service relationships (Hennig-Thurau, Groth, Paul, and Gremler 2006), financial consulting services (Naylor 2007), customers' in-store verbal expressions (Puccinelli et al. 2010) and a *Psychology and Marketing* issue partially dedicated to nonverbal cues in retail settings (Grewal et al. 2014).

Across these diverse studies, a common theme is the distinct ways nonverbal cues are perceived and processed by receivers—here customers[4] —in face-to-face interactions. Specifically, customers are posited to be sensitive to nonverbal cues because of their authenticity, and process these cues to infer affective qualities of the FLE due to its evaluative content[5]. Studies using functional communication theory show that customers are acutely aware of, and attend to nonverbal cues in face-to-face interactions because they are functional in

[4] Hereafter, to situate our discussion, we use customers to refer to receivers, and FLEs to senders in communications.

[5] Nonverbal cues are also thought to carry "status" content—that is, to communicate the status of the sender (e.g., "high status" through erect posture, non-smile and social distance). The status dimension is more relevant in situations that involve ongoing interactions in primarily structured setting (e.g., workplace). In problem-solving interactions, this dimension is less likely to be relevant and not developed here.

revealing the "true" affective states or emotions than are the more carefully managed" emotional displays that the FLE may use to "establish face" (Bonoma and Felder, 1977, p. 170). 977). In a sense, FLE's authentic affective state ***leaks*** into nonverbal cues that customers use to ***evaluate*** FLE's internal affect toward them and the problem at hand.

We posit that affect inferred by customers from FLE's nonverbal cues will conform to the contrast mechanism under outsourced regulation, as outlined for relational work. However, because customers perceive nonverbal cues often as more authentic and diagnostic than verbal cues due to what Bonoma and Felder (1977) refer to as the "unintentional display effect," we expect the moderating effect of FLE affect to be stronger (more negative) than FLE relational work. We reason that, similarly to FLE's relational work, customers who are actively regulating FLE actions (solving work) toward problem solving are likely to have limited tolerance for "overly" positive affect. Affective states that are appropriate, even desired, in typical service interactions (e.g., delighted, happy) are posited to evoke contrast effects with customers' own subdued, if not negative, affective state (e.g., neither delighted nor happy). Customers are also likely to perceive that FLE's positive affect is less conducive to effortful and diligent problem-solving as attention to detail and careful consideration of alternatives are found to be more likely under subdued affective state. Past research supports our assertion of the differentially stronger effect of nonverbal cues. For instance, Paul, Hennig-Thurau, and Groth (2014) found that, in a restaurant (experimental) setting, FLE's nonverbal cues during dining experience had a positive and stronger effect on customer's service quality perceptions, while the effect of verbal cues was non-significant; however, this setting is a typical service interaction. No study to date has examined similar effects in a problem-solving context. In terms of dynamic effects, we hypothesize that the moderating effect of FLE affect will be increasingly stronger (more negative) as the problem-solving interaction moves from sensing to settling (as per contrast effect). In the initial stages, customers may perceive FLE's positive affect as acceptable norms for initiating interactions with strangers on a good footing, but, as the interaction gets to the business of seeking and settling, such displays of positive affect are likely to increasingly appear inappropriate, even insensitive, to customer problems. Thus, we posit:

H3: *FLE's positive affect will exhibit an increasingly negative moderating effect on the influence of solving work on CSAT during a problem-solving interaction.*

Method

Research setting. Testing hypotheses requires longitudinal, in-situ capture of ongoing problem-solving interactions between FLE and customers. Prior research has advocated the use of a prospective, naturalistic-observational design (Ma and Dubé 2011; Rafaeli and Sutton 1987) to mitigate contamination by recall and desirability biases typical of the retrospective self-report designs. Furthermore, to overcome obtrusiveness (e.g., observers hinder the natural interaction process) and incompleteness (e.g., observers miss details) concerns from using human observers in a naturalistic design, video recorded "observations" of real-time interactions is recommended (Echeverri 2005; Vom Lehn 2006). Yet, video recording is not without disadvantages. When salient to customers it raises privacy concerns (e.g., intruding personal space) even in public spaces that are open for recording and observation (Belk and Kozinets 2005). When it was publicly reported that department stores are using mannequins to video record customers' store visits (i.e., by placing cameras in the mannequin's eyes) to obtain "naturalistic" observations (Clark and Whittier 2012), uproar and backlash from consumers was swift and strong. Retailers and service providers are understandably hesitant to allow store video recordings to be used for purposes other than safety, theft and criminal control.

Within these considerations, we utilize fly-on-the-wall (FoTW) video recordings of problem-solving interactions to obtain observational data in natural settings. A FoTW is a genre of television shows that focuses on interactions and events in their naturalistic settings without scripting but with consent of parties involved. Such FoTW video recordings have been used as a data source in many research domains ranging from media (e.g., Doyle 1998) to communication (e.g., Nabi et al. 2003). It gives priority to a naturalistic setting but relaxes the observational condition by securing customer consent to video record their interactions in actual service experiences. While consenting might degrade authenticity and foster impressionistic behavior, prior research has demonstrated that customers and service employees are quick to acclimatize and return to the business of interaction once past the consent phase, allowing video recording to recede to the background (Imada and Hakel 1977; Penner et al. 2007).

We located and secured the FoTW series "Airline"—originating in the UK (http://en.wikipedia.org/wiki/Airline_(UK_TV_series)) and its spin off in the US (http://en.wikipedia.org/wiki/Airline_(U.S._TV_series)) as data source for our study. The Airline FoTW data has several features that make it particularly relevant for our study. First, the primary focus of this data source is on problem-solving interactions between FLEs and customers. Typically, once a service failure is observed, it follows the "business-as-usual" interactions of customers and airline FLEs (ground staff and on-board staff) at check-in, departure gates, and in-flight at easyJet's operations at Liverpool and Luton airports (for "Airline UK") and Southwest's operations at Chicago and Los Angeles airports (for "Airline US"). Second, the data are substantial. The series video-recorded 100 episodes in UK during 1998-2006 and 18 episodes in the US during 2004 with each episode focusing on multiple problem-solving interactions (usually 2 to 4 per episode). Third, the Airline FoTW series captures problem-solving interactions in their naturalistic setting with no scripting. To assess data validity, we conducted structured interviews with the series producers and editor (discussed below).

Data quality assessment. To assess the quality of the FoTW interaction data, we conducted structured interviews with two producers and one editor of Airline UK who addressed questions pertaining to (a) integrity of actual problem-solving interactions in the video recordings, (b) criteria used to sample problem interactions for recording, and (c) constraints which guided the recording and editing of the interactions. First, in terms of sampling criteria for identifying episodes and protocols for video-recordings, the producers noted that they randomly selected real-life customer interactions as they occurred without any interference during a regular business day. Only one camera crew was assigned to a given airport to limit tendencies to pick and choose interactions. Typically, camera crew waited near a check-in counter and started shooting an event once a customer presented a problem and permission was obtained for recording the event (refusal incidence was small, < 10%). The camera crew was also passport ready and sometimes flew with the customer to complete a story. Importantly, the producers confirmed that their central objective was capturing the authenticity of the interactions and the camera crew was specifically trained not to intrude in the process of problem-solving.

Second, the series editor shared with us the protocols for capturing and cutting video recordings, which was independently verified by the producers. As per protocol, the camera crew was instructed to capture the customer problem-solving interactions in as complete a form as possible. Typically, shooting time ranged from 30 minutes to over 3 hours for a specific interaction. Protocols were established to trim the recorded content to 10 minutes or less by (a) eliminating content that did not directly include interaction between customer and airline employee (e.g., customer waiting for the airline employee to return or for updates), and (b) using voice overs to fill in details about non-focal transpired events to maintain a clear, authentic story line. Third, though the broadcasting organization reviewed content and provided input, the editorial control of the content remained entirely with the series producers and editors. Together, these features make the Airline FoTW series of robust quality and relevance for our study.

Sampling. We sampled 99 interactions from a total of 138 problem-solving interactions based on the following criteria. First, to ensure sufficient longitudinal data for dynamic analysis, we confirmed that the duration for each interaction was $\geq$3 minutes which required excluding 12 interactions. Second, prior research indicates that a mix of long and close-up shots is needed to observe nonverbal cues. Thus, we only sampled interactions that dedicated at least 25% of video-content to close-up and long shots resulting in a loss of another 12 interactions. Finally, we set a threshold that at least 80% of video content per interaction focuses on customer-FLE communication, which reduced the usable interactions to 99. We further set aside 9 interactions as a "test" sample for grounded research needed to build and validate a dictionary of verbal and nonverbal cues corresponding to study constructs. The remaining 90 interactions served as an "analysis" sample for hypotheses testing. The test sample did not differ from the analysis sample in terms of length ($t= 1.21$, $p > .10$) or number of episodes per interaction ($t = .75$, $p > .10$).

For dynamic analysis of problem-solving interactions, we used a "segment" as the unit of analysis. A segment is a slice of problem-solving interaction that is spliced at naturally occurring turn-taking events. For our data, each segment was 20-60 seconds in duration, and each interaction comprised 4-5 segments that had time-specific tags to capture their sequential order. Ambady and Rosenthal (1992) have shown that slices of 20-second interval are sufficient to draw conclusions about displayed behaviors. Finally, studies of nonverbal cues require sampling at a lower order of analysis—*thin* slices—that occur over very brief period of time (1- 5 seconds). Coding of nonverbal cues requires precision coding of face, hand gestures and body movements that can change quickly in a 20 second duration. For this precision, we further spliced each segment into 1-9 thin slices of 5-10 seconds duration each. To capture the fluidity in displaying nonverbal cues we included 2 seconds of content before and after each thin slice. Thus, our usable sample of 99 interactions resulted in 358 segments and 765 (959) thin-slices for FLE affect (CSAT) assessment (see Table 1 for all key terms). (Tables follow References.)

Measurement libraries

Video recordings are customarily coded separately for audio (e.g., verbal cues) and visual content (e.g., nonverbal cues) by using validated dictionaries that correspond to specific constructs of interest (see Hill et al. 2014; Podsakoff et al. 2013; Short et al. 2010). Obtaining validated measurement libraries (that contain multiple dictionaries) requires multiple, iterative steps including: (a) conceptual grounding by linking verbal and nonverbal cues to viable construct representations, (b) situational grounding by having expert judges evaluate verbal and nonverbal cues as viable construct representations in a given contextual setting (e.g., cues take different meaning in different situations), (c) conceptual-situational consistency by reconciling conceptual and situational grounding results via iterative loops to develop an initial dictionary for each construct, (d) identification of distinct dimensions for each construct (if not, iterate), (e) coding scheme by developing an approach for quantifying the cues included in construct dictionaries for use as operational measures, (f) discriminability evidence by testing that coded constructs capture sufficient variance in study constructs (if not, iterate), (g) ecological validity by examining that coded measures of the same construct behave as expected by construct and measure definitions (if not, iterate). Fortunately, researchers have developed extensive dictionaries of validated verbal and nonverbal cue representations for a wide range of conceptual phenomenon, among them Harvard Enquirer, a dictionary of 11,788 words commonly used in English and categorized in 26 macro and 182 micro categories, Whissell's (2009) RDAL categorizing 8000 English words into positive or negative in valence, and Ekman et al.'s (1997, 1999, 2003) FACS system for categorizing most facial expressions into action units that indicate specific emotional states. A drawback of these dictionaries is that they are intended for general use and lack contextual sensitivity. For studies that emphasize situational meaningfulness for use in specific contexts, they are nevertheless useful as starting points for original dictionary refinement and development.

To avoid confounding of verbal and nonverbal cues in developing dictionaries, each segment is separated into two components: (a) an audio sans video component for verbal cues (solving and relational work), and (b) a visual sans audio component for nonverbal cues that was further spliced into thin slices (CSAT and FLE affect). As per their constitutive differences, measurement procedures differed for verbal and nonverbal cues. For verbal cues, our procedures focus on communicative qualities of individual words to cue solving and relational work constructs. Using existing dictionaries and the “test” sample, we develop, refine and validate dictionary of words that correspond to solving and relational work, and thereafter use these dictionaries to automate a process for extracting measures for each slice of problem-solving interaction in the “analysis” sample. Before automation, we examine the face, convergent and discriminant validity of derived measurement dictionaries.

For nonverbal cues, our procedures were tailored to video features in made-for-television series including repeated use of zooms, pans, close-ups, cutaways and other video-journalistic styles to engage audience, capture authentic emotions/events, shoot story layers and manage transitions. This rules out approaches that require relatively fixed video capture such as in laboratory experiments or Ekman et al.’s (1997, 1999, 2003) FACS system. Moreover, problem-solving interactions are relatively unique in the display of nonverbal cues. Customers are angry or agitated by problems that aggravate them, and FLEs are restrained or subdued to facilitate problem-solving without escalating them. This requires us to develop, refine and validate dictionaries for nonverbal cues based on substantial grounded work. Since non-verbal coding ought to represent how these cues are interpreted by observers, our grounded approach mimics this interpretation using human coders. Specifically, we used the “test” sample to develop nonverbal cue coding rules by checking for consistency among human coders in: (a) identifying the valence of nonverbal cue in each thin slice (e.g., positive, neutral or negative), and (b) isolating the source of nonverbal cue in a combination of kinesics (i.e., smiling, raising eye brows, head shaking), proxemics (i.e., body movement for distance and posture), and haptics (i.e., gestures of touching, tapping, and waving). Consistency of coding rules across diverse observers provides validity evidence; however, this process is not easily automated. As such, coding of nonverbal cues relied on human coders who used the identified and validated rules to provide construct measures for each thin slice of the “analysis” sample.

FLE solving work. We initially reviewed the Harvard Enquirer library to identify relevant micro-categories associated with “knowing,” “assessing,” “problem-solving,” “interpersonal interaction,” and “work,” as a starting point for our development. This resulted in an initial set of 3305 words; however, not all words are situationally relevant in customer service and problem-solving context. To situationally ground and refine this list, we asked two domain experts in the area of services marketing to sort these words into two categories (relevant/not-relevant) for meaningfulness as solving work (based on definition provided) in a problem-solving context. This resulted in a refined dictionary of 620 words after three iterations of reconciling conceptual and situational grounding of initial dictionary of words (terminated after inter-rater reliability of .83). We further supplemented the preceding deductive analysis with an inductive refinement of solving dictionary. As per procedures outlined by Abrahamson and Park (1994) and Doucet and Jehn (1997), we used the "test" sample of 9 interactions to generate a list of 65 frequently used words by FLE in communicating solving work ($\geq$ 5 times) in the sample which were cross-compared with solving dictionary of 620 words identified earlier. This procedure yielded 29 additional words, resulting in an updated solving work dictionary of 649 words. To refine the solving dictionary, two research assistants classified each word into one of two dimensions identified based on grounded analysis (inter-coder reliability = .86 after 3 iterations): (1) "competence" words that indicate FLE has the skill and expertise to comprehend, analyze and communicate information related to problem-solving (usually adjectives and conjunctions that connect ideas, things, and objects such as why, when, what, while, because) and (2) "action" words that indicate FLE effort and engagement in working out solutions (usually verbs such as go, do, offer, transfer, send, investigate and provide). This procedure resulted in categorizing 315 competence and 334 action words.

Next, we reasoned that the individual dictionary words were not equivalent in communicating solving work. Some words such as "investigate" and "because" are likely to be perceived as stronger cues for solving work relative to words such as "send" and "while." We refer to this cue strength as intensity for solving work. Because everyday customers make intensity evaluations in problem-solving interactions, we developed an intensity coding scheme by asking respondents to rate each solving word on a 1-3 scale (1=low active, 3=high active). Each word was rated by at least 10 respondents. In all, 219 undergraduates from a large mid-western university acted as respondents for this purpose as students are suitable for evaluating everyday use of words in service interactions. Scores across respondents were averaged for each word to arrive at a single intensity score.

To operationalize solving work dimensions, we multiplied the occurrence (frequency as 0/1) of each competence and action word in the solving dictionary by its intensity score (1-3) to obtain an overall sum of solving work displayed in any given segment of problem-solving interaction (audio content was transcribed). To account for varying segment and interaction length, the sum scores were normalized by dividing with time taken by the FLE to communicate the sentence (using time stamps) to obtain a weighted solving measure for subsequent analysis.

FLE relational work. Relational work involves expressions of empathy, attentiveness, respect and courtesy to strengthen relationship bonds with customers. A common feature of these words is that they carry approach or avoidance meaning for recipients. Whissell's (2009) RDAL that categorizes 8000 English words by their positive or negative valence was a starting point for our relational dictionary. Not all 8000 words were relevant to problem-solving. Following the procedure outlined for developing, refining and validating the solving dictionary, we identified 244 relational words with acceptable consistency (inter-rater reliability = .88). We supplemented this dictionary with an additional 20 words based on inductive analysis of word choices that raters perceived indicated FLE relational work in our "test" sample. Similar to solving work, two research assistants further classified each word in the relational dictionary into two dimensions (inter-coder reliability = .89, after 2 iterations): (1) "agreeable" words that indicate FLE's expressions of good-nature, courtesy, respect, generosity, helpfulness, and cooperativeness (Barrick and Mount 1991) (often including adjectives, interjections, verbs such as yes, no, yeah, agree, calm, care, help, believe, and hear) and (2) "compassion" words indicated by FLE's expressions of kindness, tenderness, empathy, warmth, sympathy, and caring (Blum, 1980; Sprecher and Fehr 2005; Goetz, Keltner, and Simon-Thomas 2010) (often including adverbs, adjectives, interjections, and verbs such as sir, madam, goodbye, apologize, appreciate, love, hello, and sorry). This procedure resulted in categorizing 88 agreeable and 176 compassion words. Similar to solving work, we further scored each agreeable and compassion word on a 1-3 intensity scale (3=high pleasant). Finally, relational work measures were extracted for the "analysis" sample by automating a procedure of: (a) observing the frequency of relational word in each segment and interaction of the "analysis" sample (0=not present, 1=present), (b) multiplying by its intensity score (1-3 scale), and (c) normalizing the obtained score by time-to-verbalize (as for solving construct).

FLE affect. FLE affect was measured by nonverbal cues. Specifically, we used the "test" sample to develop nonverbal cue coding rules by asking human coders to: (a) identify the valence of nonverbal cue in each thin slice (e.g., positive/neutral/negative), and (b) isolate the cue source in a combination of facial (i.e., smiling, raising eye brows, head shaking), bodily (i.e., distance and posture), or gestural cues (i.e., touching, tapping, and waving). Two expert judges viewed thin slices from the “test” sample to identify 20 specific nonverbal cues associated with FLE feeling states (7 positive and 13 negative) that they (a) rated for valence on a scale of 1-7 (1=extremely negative and 7= extremely positive), and (b) evaluated for salience by allocating 100 points across the two salient nonverbal cue categories based on their significance (face, body or hand gestures). This procedure was refined for clarity and consistency until acceptable inter-judge reliability was obtained (.81). Thereafter, we trained two research assistants to independently code the thin slices from the “analysis” sample for FLE affect. To test for training efficacy, each coder completed the “Reading the Mind in the Eyes” revised test; both scored higher than 30 points and, as per test scoring manual, were assessed as “excellent” (scores >30; average = 22-30). The inter-coder reliability was .77.

CSAT. Following past research (Mattilla and Enz 2002; Sundaram and Webster 2000), we operationalize CSAT as customers’ feeling states of fulfillment, contentment and pleasure that come from experiences that meet or exceed their expectations. In developing, refining and validating nonverbal cues of CSAT, we used procedures parallel to those noted for FLE affect except that they are centered on the customer. We obtained satisfactory inter-coder reliability both in the training (.81) and final coding procedures (.84).

Control variables. Variables that might influence the modeled relationships were included as controls (i.e., gender, dress, height, and age). Inter-rater reliability for the variables ranged from .87 to .96. Table 2 presents correlations and descriptive statistics.

Model for hypotheses testing

The data in our study have a nested panel structure, where sequentially time-ordered segments (ST) are nested within dyadic frontline problem-solving interactions. The focal outcome, CSAT, is segment-specific as are its drivers, (FLE’s solving and relational work, and affect), that are hypothesized with time-dependent effects. To accommodate this nested data and the dynamic effects of hypothesized variables on the CSAT variations within interactions, we employ a random- parameters model (Greene 2008) to test the hypotheses as follows:

$$CSAT_{jkt} = \beta_0 + \beta_{1t}ST_{jkt} + \beta_2 CUSG_j + \beta_3 CUSR_j + \beta_4 CUSA_j + \beta_5 CUSD_j + \beta_6 SOLVING_{jkt} + \beta_7 RELATION_{jkt} + \beta_8 AFFECT_{jkt} + \beta_9 CSAT_{jk(t-1)} + \varepsilon_{jkt} \quad (1)$$

$$\text{where } \varepsilon_{jkt} \sim iid\ (0, \sigma^2)$$

$$\beta_{1t} = \alpha_0 + \alpha_1 SOLVING_{jkt} + \alpha_2 RELATION_{jkt} + \alpha_3 AFFECT_{jkt} + \alpha_4 SOLVING_{jkt} \text{ x } AFFECT_{jkt} + \alpha_5 SOLVING_{jkt} \text{ x } RELATION_{jkt} + \alpha_6 EMPG_k + \alpha_7 EMPR_k + \alpha_8 EMPA_k + \alpha_9 EMPD_k + \zeta_{1jkt} \quad (2)$$

where $\zeta_{1jkt} \sim N(0, \sigma^2)$

where t = time, j = customer, and k = FLE; ST = segment/time when repeated measures are collected (ranges from 2 to 5); SOLVING = FLE solving work, RELATION = FLE relational work, AFFECT = FLE affect, CUSG/EMPG = customer/employee gender (0 = female, 1 = male), CUSR/EMPR = customer/employee race (0 = Caucasian, 1 = Others), CUSA/EMPA = customer/employee age (0 = less than 30 years, 1 = > 30 years), CUSD/EMPD = customer/employee dress (0 = poorly dressed, 1 = well-dressed).

Multicollinearity. Since FLE relational and solving work correlate at .64, we addressed potential multicollinearity with an instrumental variable for RELATION that is orthogonal to SOLVING. Subsequent assessment of VIFs indicated that they are uniformly under 5 (range = 1.52 to 2.58) (Neter, Wasserman, and Kutner 1989).

Endogeneity and alternative models. The focal FLE-customer interaction results in temporally-ordered and contemporaneous measures of the study variables. Typical dynamic panel data models, such as the Arellano-Bond specification, are not appropriate because such models require the presence of time-varying exogenous variables, which our data and research setting do not provide. However, we remain sensitive to the potential endogenous relationship among our study variables at any point of time (t) due to the temporal order and contemporaneous measurement in the data. We follow Jacobson's (1990) and Fair's (1970) instrumental variable stepwise approach (see Mizik 2014; Mizik and Jacobson 2008; Srinivasan et al. 2011; McAllister et al. 2007 for applications). As per this approach, we first developed instrumental variables for FLE solving work, relational work and affect by regressing the current value of each variable on its past values lagged one period as well as CSAT lagged one period. We employed first order lagged terms (similar to studies cited above) as the number of time periods (episodes) per interaction in our panel data ranges between 3 and 5. Using second-order lagged terms would have reduced the length of the panel by 2/5 to 2/3 thereby compromising the power for hypotheses testing. We retained the predicted values of FLE solving work, relational work and affect as instruments of FLE solving work, relational work, and affect in estimating equation 1 above. These instrumental variables are correlated with the current values of the predictor variables and, because they occur temporally prior, they cannot be influenced by contemporaneous unobservables (Jacobson 1990).

Lagged dependent variable. To account for path dependency of $CSAT_t$, we included $CSAT_{t-1}$ as a predictor in Equation (1).

Results

Evidence of interaction phases. We examined the expected pattern of progression from *sensing* and *seeking* to *settling* activities in problem solving interactions. We randomly selected 12 complete problem-solving interactions, and categorized the segments for each interaction into sensing (segment 1), seeking (segments 2 and 3) and settling activities (segments 4 and 5).. After randomizing the segments from different interactions, we asked respondents to independently categorize each segment into one of three categories based on definitions provided. In all, 15 respondents who were unware of study purpose provided categorization judgments which yielded an overall inter-rater reliability of 93.3% (Perreault and Leigh 1989), and 95%, 94%, and 92% for sensing, seeking, and settling respectively. For all categories, judges' dominant category assignment was consistent with category assignment based on our earlier coding. This provides strong support for the sensing, seeking, and settling interaction phases in our data.

Measure validity. We utilized confirmatory factor analysis (CFA) to examine the convergent and discriminant validity of solving and relational constructs because both are measured with verbal cues that correspond to two distinct dimensions each, and these dimensions are expected to behave as reflective indicators. A CFA with the competence and action dimensions hypothesized to load only on solving factor, and the agreeableness and compassion to load only on relational factor produced overall fit statistics of $\chi^2 = 4.9$, df = 1, $p > .02$), relative fit statistics of CFI = .99 and TLI = .99, and absolute fit statistics of RMSEA = .11, $p > .05$. These fit statistics are consistent evidence of acceptable fit in support of the hypothesized factor structure. In addition, in support of convergent validity, the composite reliabilities for the solving and relational constructs are estimated at .91 and .83 respectively, consistent with high ($>$ .7) and significant ($p < .001$) loadings without exception. Finally, the solving and relational constructs extract significant variance of .85 and .73 respectively, which widely exceeds the variance they share at .47 thereby providing support for their discriminant validity.

The FLE affect (and CSAT) measures involve coding of bodily, facial and gestural cues that are *different* ways of displaying affect. Past research suggests that senders use these verbal cues uniquely (Aviezer, Trope, and Todorov 2012). Consistent with this, we compute composite measures for FLE affect (and CSAT) based on an unweighted combination of facial, bodily and gestural cue measures. Because FLE affect and CSAT use common nonverbal cues as constituent measures (but are centered differently on FLE or customer), discriminant validity is a concern. Our results show that FLE affect and CSAT measures are not collinear (VIFs < 2), and share less than 12% of their variance. In addition, we expect that FLE affect precedes CSAT. To test this, we examine the interactive effect of FLE affect and segment (time) on CSAT, which is significant (.24, $p < .001$) supporting nomological validity of the two measures.

Model fit. We assessed model fit in three steps. First, we tested different functional forms for ε_{ijk} in equation 1 to identify the best fitting model. AIC comparison for these non-nested models indicated that a normal and logistic *pdf* are the best fitting parametric forms with the logistic specification outperforming the normal (AIC = 761 versus 769.1). Second, we compared the hypothesized model (M_{AH}) to a model that contained only control variables (M_{AC}) (gender, race, age, and dress for both FLE and customer). A likelihood-ratio test shows that the hypothesized model is a superior fit to the data compared to the controls only model ($\chi^2_{8\ d.f} = 303.68$, $p < .001$). This is further confirmed by the lower AIC for the hypothesized model (AIC =761.0) compared to controls only model (AIC = 1046.7). Third, we compared the hypothesized model with a competing model (M_{AS}) which ignores the dynamic effects of FLE solving and relational work as well as affect on CSAT. A likelihood-ratio test reveals that the hypothesized model is a superior fit to the data compared to a static model ($\chi^2_{5\ d.f} = 12.04$, $p < .05$), indicating that dynamics within an interaction cannot be ignored. This is further supported by a comparison of the AIC for the hypothesized (AIC =761.0) and the static model (AIC = 762.8). Overall, these results provide robust support for the hypothesized dynamic effects model for the influence of FLE solving and relational work as well as affect in explaining the evolution of CSAT during a customer problem-solving interaction.

Hypotheses testing. Table 3 shows the results of hypotheses testing (equations 1 and 2). The results show that FLE solving work has a positive and significant impact on CSAT (.24, p <

.001)[6] as the interaction unfolds. A Wald test reveals that the impact of solving work on CSAT increases steadily from .17 ($p < .10$) at the beginning (segment 1) to .65 ($p < .03$) (segment 3) and 1.13 ($p < .001$) at the end of the interaction (segment 5). This supports H1.

Table 3 also indicates that FLE relational work negatively and significantly interacts with solving work and segment (−.13, $p < .02$). To understand this moderation effect, we follow Spiller et al. (2013) to assess the impact of solving work on CSAT in a range (−2SD to +2SD) of relational work and segments (1 to 5), everything else equal. The results, displayed in Figure 1a, show that relational work significantly diminishes the influence of solving work on CSAT, everything else equal. In the beginning of the interaction (segment 1), the impact of solving work on CSAT decreases from .45 ($p < .01$) at low (−2SD) relational work, to .17 (*ns*) at mean, and −.09, *ns* at high (+2SD) relational work. The same pattern emerges in the middle (end) of the FLE-customer interaction where the effect diminishes from 1.46, $p < .001$ (2.47, $p < .001$) at low relational work to .65, $p < .003$ (1.13, $p < .001$) at mean relational work, and −.15, *ns* (−.21, *ns*) at high relational work. Overall, solving work exhibits a positive and significant effect when relational work is low (below .7SD) and a non-significant effect on CSAT when relational work is higher than .7SD. Taken together, increasing relational work beyond its average value negatively moderates the influence of solving work on CSAT over time in accord with H2. (Figures follow References.)

In terms of H3, Table 3 shows that FLE affect exhibits a negative and significant interaction with solving work and segment (−.20, $p < .001$). We performed a Wald test to assess the impact of solving work on CSAT over a range (−2SD to +2SD) of affect and segments (1 to 5), everything else equal. The results in Figure 1b show that affect significantly decreases the influence of solving work on CSAT. At the beginning (segment 1), the impact of solving work on CSAT decreases from .58 ($p < .001$) at low (−2SD) affect, to .17 ($p > .1$, *ns*) at mean, and −.23 ($p > .1$, *ns*) at high (+2SD) affect. A similar but stronger pattern emerges in the middle (end) of the interaction where the influence of solving work diminishes from 1.87, $p < .001$ (3.17, $p < .001$) at low affect to .65, $p < .003$ (1.13, $p < .001$) at mean affect, and −.56, $p < .09$ (−.90, $p < .09$) at high affect. Overall, solving work has a positive and significant influence on CSAT when affect is low (below .5SD), a non-significant influence when affect is between .5SD and 1.9SD,

[6]One-tailed p-values are reported throughout in accord with the directional hypothesis proposed (H_1, H_2, and H_3).

and a significant negative influence when affect is higher than 1.9SD. More specifically, when affect is below .5SD, it intensifies the positive effect of solving work on CSAT as the interaction evolves. Overall, these results provide support for H3 demonstrating that affect negatively moderates the influence of solving work on CSAT over time as it increases above its mean value.

Robustness checks. We performed a series of robustness checks to evaluate the sensitivity of the obtained results to different aspects of the model and its estimation. First, we examined the robustness of model inferences by changing the number of draws in the Halton simulation for random parameters estimation (equations 1 and 2). The results indicate that increasing the draws from 100 to 1000 results in non-significant changes in the parameter estimates with the absolute magnitude of change ranging from .002 to .01 (< 5%). Second, we examined a more parsimonious model which does not include the static effects and focuses only the dynamic effects of FLE work and affect. The results indicate that the obtained parameters remain the same and the statistical inference is unaltered.

Third, using the notion that interactions with no change in CSAT are indicative of "no-resolution" interactions, we split out data into two samples: (1) one where the CSAT is low (below 4 on a 7-point scale) and remains low throughout the exchange with CSAT change less than ± 1 ($p > .05$), which we refer to as the CSAT"=" (no-resolution) sample, and (2) another sample where CSAT evidences an increasing pattern with CSAT change > 1 ($p < .05$) across episodes (within interactions), which we refer to as the CSAT"+"(resolution) sample. Next, we estimated an econometric model where we introduced a dummy variable which equals 1 for the CSAT"=" sample and 0 for the CSAT "+" sample. We modeled NC interactions with the dynamic effects of FLE solving work, relational work and affect. The results, presented in Table 5, demonstrate than 9 out of the 10 modeled interactions are not statistically significant. In other words, the 9 insignificant interactions indicate that there is no statistically significant difference in the dynamic impact of FLE solving work, FLE relational work or affect (simple and interaction effects) between the CSAT"=" and CSAT"+" samples. One significant interaction was the dynamic effect of FLE solving work x affect with NC (coefficient = .62, $p < .01$), which shows that an increase in FLE Affect enhances the impact of FLE solving work over time for the interactions where CSAT is low and remains low.

Generalizability. To shed light on the generalizability of obtained findings, we examine the degree to which the results of this study are replicable in a completely different context as part of a separate study (Singh, Marinova, Singh, and Evans 2016). Data were obtained from a life insurance selling study involving consumer couples recruited to participate in a face-to-face "sales call" with a salesperson experienced in selling insurance. Couples met a salesperson for 45-60 minutes to discuss life insurance needs, wherein the salesperson addressed customer's objections and tried to sell a suitable insurance plan. The interaction was fully video-recorded. In all, data for 32 sales call (178 segments and 212 thin slices) were used for our analysis. We followed the same measurement and analysis procedures as noted above.

As summarized in Table 6, the results from life insurance study replicate the major findings from the main study. Specifically, as per H1, FLE solving work has a significant influence on CSAT (.05, $p < .05$) at the mean levels of FLE relational work and affect. Moreover, the effect of solving work increases from .05 ($p < .05$) at the beginning to .44 ($p < .05$) in the middle, and to .77 ($p < .05$) at the end of the interaction. However, consistent with H2, FLE relational work negatively interacts with FLE solving work (-.08, $p < .001$). Likewise, FLE affect shows a negative interaction with solving work (-.09, $p < .001$) such that it significantly negates the influence of solving work on CSAT, as per H3. Wald tests for H2 and H3 reveals similar pattern. The effect of solving work on CSAT decreases as the interaction progresses from low (-2SD) levels of FLE relational work/affect towards high (+2SD) levels of FLE relational work/affect. Similar to main study, we tested the robustness of the findings by altering simulation draws from 100 – 1000 (<1% change) and omitting static effects (< 12% change).

Overall, our main finding that high levels of both FLE affect and relational work appear to undermine the positive effect of solving work on CSAT as the frontline problem-solving interaction advances is robust to alternative explanations and reproducible in different contexts.

Discussion

We aimed to study the dynamics of frontline problem-solving using video recordings of customer-agent interactions following service failure. We advance past studies by shifting research attention from *states* of customer problem solving (e.g., attributions, fairness, severity) to *processes* of problem solving interactions (e.g., solving/relational work dynamics). Employing a linguistic approach to study interaction processes, we examine the time-varying effects of FLE verbal and nonverbal behavioral cues that customers use to make inferences about problem solving progress and effectiveness. Our empirical analysis uses longitudinal panel data of 90 problem-solving interactions (n = 327 interaction segments) extracted from video recordings for a "fly-on-the wall" made-for-television series titled, *Airline*© (both in US and UK). Our findings demonstrate that FLE verbal cues that indicate solving work exhibit an increasingly positive effect on CSAT as the interaction evolves. However, the positive influence of FLE solving work on CSAT is: (1) neutralized (less positive) when FLEs also display verbal cues associated with high levels of relational work, (2) negated (turns negative) when FLEs display nonverbal cues that indicate high levels of positive affect, (3) robust to service failure conditions that are unamenable to problem resolution, and (4) generalizable to different problem solving contexts involving face-to-face interactions. Understanding the theoretical and practical implications of these intricate frontline problem solving effects holds a potential to elevate customer experiences following service failure, an area where service firms often falter and fail to deliver satisfying customer outcomes. We discuss our findings and implications below.

Limitations. Several limitations are relevant for our study. First, the study utilized high involvement problem-solving interactions as the study context. Although we see nothing in the conceptual framework or empirical approach that prevents the application of our findings to other problem-solving interactions, future studies should examine such scenarios to confirm the generalizability of the study results. Second, it is useful to extend this study by including a more comprehensive list of variables as controls. Archival video data allows us to code for variables that were part of the customer-employee interactions. However, we do not capture customer or FLE specific dispositional measures due to lack of access to the focal customers and FLEs.

Nature of frontline problem-solving interactions: phases and dimensions

Our findings clarify the nature of frontline problem solving by conceptualizing and providing empirically validated dictionaries for novel frontline problem solving constructs. Specifically, we identified FLE solving work, relating work and affect as theoretically grounded and empirically distinct constructs of FLE problem-solving that are more diagnostic of interaction outcomes and can be subsequently utilized for FLE training and development (Homburg, Koschate, and Hoyer 2006; Bradley et al. 2013; Liao 2007; Sirdeshmukh et al. 2002). A novel feature of these constructs is that they represent the language of problem solving and are conceptually grounded in the verbal cues communicated, and nonverbal cues displayed by FLEs during problem solving interactions. Several features of these novel constructs are noteworthy.

First, while past research has examined FLEs verbal (e.g., Ma and Dubé 2011) and nonverbal cues (e.g., Mattilla and Enz 2002; Sundaram and Webster 2000) in assessing service interactions (Puccinelli et al. 2010), most studies focus on either verbal or nonverbal cues in isolation. Our study is one of the first to provide a simultaneous analysis of both verbal and nonverbal cues. Second, we conduct significant grounded work to operationalize focal constructs as empirically validated dictionaries of verbal and nonverbal cues that can be used broadly in future studies of frontline problem solving interactions. Use of our validated dictionaries ensures consistency in the conceptualization and operational of key constructs. Third, and finally, we provide nomological evidence for the dynamic influence of the focal problem solving constructs on CSAT as the interaction unfolds. Specifically, we show the dynamic effect of focal constructs across three relatively distinct but interrelated phases of problem solving – sensing-seeking-settling, which characterize the progression of a problem solving interaction towards closure. We encourage service researchers to adopt a phase approach in future problem-solving research as phases could be a useful unit of analysis for studying the nuanced influence of frontline problem solving language cues on interaction outcomes.

Effective problem-solving: **high solving work, with low relational work and affect**.

We extend the current literature by showing that the positive impact of FLE solving work on CSAT intensifies during a problem solving interaction. In particular, the impact of FLE solving work in lifting CSAT increases more than five times in our setting, from .85 in the beginning or sensing stage to 4.52 at the final settling stage. This coheres with the growing recognition that solving work is instrumental in shaping CSAT (Bradley et al. 2013) and also offers support to Van de Ven, Delbecq, and Koenig's (1976) hypothesis that, under uncertainty, employees indulge in more instrumental actions in efforts to achieve a desired outcome.

Unlike much prior research, we show that the effect of solving work on CSAT is boosted by low versus high levels of FLE relational work and affect (see Figure 1a and 1b). Moreover, these effects become stronger as the interaction advances toward settling. Specifically, our findings reveal that the effect of FLE problem-solving on CSAT is positive throughout the interaction only when relational work is below .7SD. Increasing FLE relational work above

.7SD renders solving work inert, i.e. its effect becomes statistically insignificant. In contrast, low levels of relational work intensify the impact of FLE problem-solving on CSAT almost fivefold, from .45 during the early sensing stage to 2.47 during the final settling stage.

A similar but accentuated pattern of results is obtained for FLE's affect. Specifically, the effect of FLE problem-solving on CSAT is positive throughout the interaction only when FLE affect is below .5SD. Increasing FLE affect above .5SD neutralizes and eventually at high levels of affect (-2SDs) results in a negative impact of solving. In sharp contrast, low levels of FLE affect facilitate and enhance the impact of FLE problem-solving on CSAT almost fivefold, from .58 during the early sensing stages to 3.57 during the final settling stages.

Thus, it appears that low levels of FLE relational work and affect are "just enough" during sensing to facilitate a difficult discussion typically charged with expressions of negative affect by dissatisfied customers. Low levels of relational work and affect allow FLEs to calm customers and gain enough information to start working on the problem. A continuance of low levels of relational work and affect during seeking and settling phases is considered "appropriate" during problem-solving as it indicates to the customer that FLEs are focused on getting the problem solved rather than building relationships.

Overall, two broad conclusions can be drawn from the obtained results. First, it appears conceptually meaningful and pragmatically useful to examine the time-varying effects of FLE verbal and nonverbal behavioral cues, indicating FLE work and affect respectively, that customers use to make inferences about frontline problem solving effectiveness. Second, we have sufficient evidence to conclude that FLE verbal cues indicating solving work get boosted at low levels of FLE relational work (below .7 SD) or affect (.5 SD). Fine-grained insights into the interacting mechanisms of solving work and relationship building dimensions provide confidence that such patterns are likely to emerge across other contexts as well. At the same time, this study must be viewed as an initial step that encourages future researchers to explore other possible asymmetric mechanisms that involve solving work and relationship building dimensions. Concurrently, our results suggest that CSAT judgments are not bound by the peak-end rule as evidenced by other scholars who viewed service interactions as a sequence of events. Rather, CSAT is evaluated either positively or negatively depending on how FLE displays relationship building dimensions during problem-solving. Further research into the formation and stability of solving work and its role in CSAT mechanisms is warranted.

Managerial Implications

For companies that, like Zappos seek to invest in training frontline agents for effective problem-solving (Mayer 2014) or like Southwest seek to invest in "live" technology that analyzes upset customers' verbal cues to assist FLE responses (McCartney 2014), our study offers several useful directions. First, this study provides a library of validated dictionaries for frontline problem-solving in service contexts which managers can use for cue-based training of frontline agents and, potentially, to feed an automated system for dynamic and live frontline assistance via innovative technology interfaces. To guide such efforts, this study shows that FLEs who consistently lifted CSAT during the Airline interaction used on average 8 high intensity solving words (upper 30%-ile) for every 10 low intensity solving words (lower 30%-ile), while those FLE who failed to lift CSAT used only half as much. Training programs and technology-assisters can help focus FLE attention on the high intensity solving words. Second, in line with our result that subdued relational work and subtle affect are optimal for effective problem-solving, we found that FLEs who were successful in lifting CSAT differed from those who were unsuccessful by (a) using fewer relational words (5 to 9 ratio) but with greater frequency of higher intensity words (8 to 5 ratio), and (b) 31.8% lower reliance on hand gestures and 61.8% higher use of body cues. In our view, training for effective solving work needs to be complemented with containing the quantity (amount) of relational work and displayed affect while maintaining its quality (intensity). We offer a validated dictionary of relational work that can be effectively deployed to achieve effective quantity/quality balance in customer problem-solving training programs and automation systems.

Concluding Notes

Our study calls for a shift in the questions that managers and researchers entertain about FLE's effort *during* problem-solving interactions. Instead of asking whether FLE work matters, our study suggests questions such as "How does FLE work dynamically impact CSAT in problem-solving?," "What specific display cues at different phases of problem-solving interaction enhance or deplete CSAT effects?," and "How does *dynamic* problem-solving tracking yield insights lost in static analysis?" By pursuing these avenues, researchers can shed new light on the effect of FLE work in problem solving interactions and the mechanisms that underlie its influence on key interaction outcomes.

References

Abrahamson, Eric and Choelsoon Park (1994), "Concealment of Negative Organizational Outcomes: An Agency Theory Perspective," *Academy of Management Journal*, 37 (5), 1302-34.

ACSI (2014), (accessed 12/30/2014, [available at http://www.theacsi.org/customer-satisfaction-benchmarks/benchmarks-by-company#S].

Ambady, Nalini and Robert Rosenthal (1992), "Thin Slices of Expressive Behavior as Predictors of Interpersonal Consequences: A Meta-Analysis," *Psychological Bulletin*, 111 (2), 256.

Aviezer, Hillel, Yaacov Trope, and Alexander Todorov (2012), "Body Cues, not Facial Expressions, Discriminate Between Intense Positive and Negative Emotions," *Science*, 338 (6111), 1225-9.

Bales, Robert F and Fred L Strodtbeck (1951), "Phases in Group Problem-Solving," *The Journal of Abnormal and Social Psychology*, 46 (4), 485-495.

Barrick, Murray. R and Michael K Mount (1991), "The Big Five Personality Dimensions and Job Performance: A Meta-Analysis," *Personnel psychology*, 44(1), 1-26.

Belk, Russell W and Robert V Kozinets (2005), "Videography in Marketing and Consumer Research," *Qualitative Market Research: An International Journal*, 8 (2), 128-41.

Bitner, Mary Jo, Bernard H Booms, and Lois A Mohr (1994), "Critical Service Encounters: The Employee's Viewpoint," *Journal of Marketing*, 58 (4), 95-106.

Bitner, Mary Jo, Bernard H Booms, and Mary Stanfield Tetreault (1990), "The Service Encounter: Diagnosing Favorable and Unfavorable Incidents," *Journal of Marketing*, 54 (1), 71-84.

Blum, Laurence A (1980), "Friendship, Altruism and Morality," Routledge

Bonoma, Thomas V and Leonard C Felder (1977), "Nonverbal Communication in Marketing: Toward a Communicational Analysis," *Journal of Marketing Research*, 14 (2), 169-80.

Bradley, Graham L, Beverley A Sparks, Dieter Zapf, Janet R McColl-Kennedy, and Nerina L Jimmieson (2013), "Task-Relationship-Self: A Framework for Understanding Service Encounter Behaviors," *Psychology & Marketing*, 30 (6), 512-28.

Brashers, Dale E, Daena J Goldsmith, and Elaine Hsieh (2002), "Information Seeking and Avoiding in Health Contexts," *Human Communication Research*, 28 (2), 258-71.

Burgoon, Judee K, Thomas Birk, and Michael Pfau (1990), "Nonverbal Behaviors, Persuasion, and Credibility," *Human communication research*, 17 (1), 140-69.

Burgoon, Judee K and David B Buller (1994), "Interpersonal Deception: III. Effects of Deceit on Perceived Communication and Nonverbal Behavior Dynamics," *Journal of Nonverbal Behavior*, 18 (2), 155-84.

Carver, Charles S and Michael F Scheier (1990), "Origins and Functions of Positive and Negative Affect: A Control-Process View," *Psychological review*, 97 (1), 19.

Clark, Jeremy A and Michael A Whittier (2012), "Retail Display Article and System," Google Patents.

Coelho, Filipe and Mário Augusto (2010), "Job Characteristics and the Creativity of Frontline Service Employees," *Journal of Service Research,* 13 (4), 426-438.

Converse, Benjamin A and Ayelet Fishbach (2012), "Instrumentality Boosts Appreciation Helpers Are More Appreciated While They Are Useful," *Psychological science*, 23 (6), 560-66.

Dietz, Joerg, S Douglas Pugh, and Jack W Wiley (2004), "Service Climate Effects on Customer Attitudes: An Examination of Boundary Conditions," *Academy of Management Journal*, 47 (1), 81-92.

Doucet, Lorna and Karen A Jehn (1997), "Analyzing Harsh Words in a Sensitive Setting: American Expatriates in Communist China," *Journal of Organizational Behavior*, 18 (S1), 559-82.

Doyle, Aaron (1998), "Cops': Television Policing as Policing Reality", *Entertaining Crime: Television Reality Programs*, 95-116.

Echeverri, Per (2005), "Video-based Methodology: Capturing Real-time Perceptions of Customer Processes," *International Journal of Service Industry Management*, 16 (2), 199-209.

Ekman, Paul (1999), "Facial Expressions," *Handbook of cognition and emotion*, 16, 301-20.

____ and Wallace V Friesen (2003), Unmasking the Face: A Guide to Recognizing Emotions From Facial Clues: Ishk.

____ and Erika L Rosenberg (1997), What the Face Reveals: Basic and Applied Studies of Spontaneous Expression Using the Facial Action Coding System (FACS): Oxford University Press.

Fair, Ray C (1970), "The Estimation of Simultaneous Equation Models with Lagged Endogenous Variables and First Order Serially Correlated Errors," Econometrica, 38(3), 507-16.

Fang, Zheng, Xueming Luo, and Minghua Jiang (2013), "Quantifying the Dynamic Effects of Service Recovery on CSAT Evidence From Chinese Mobile Phone Markets," *Journal of Service Research*, 16 (3), 341-55.

Fishbach, Ayelet and Stacey R Finkelstein (2012), "How Feedback Influences Persistence, Disengagement, and Change in Goal Pursuit," *Goal-directed behavior*, 203-30.

Fitzsimons, Gráinne M and Eli J Finkel (2011), "Outsourcing Self-regulation," *Psychological Science,* 22 (3), 369-375.

Fredrickson, Barbara L (2001), "The Role of Positive Emotions in Positive Psychology: The Broaden-and-Build Theory of Positive Emotions," *American psychologist*, 56 (3), 218.

Gelbrich, Katja and Holger Roschk (2011), "Do Complainants Appreciate Overcompensation? A Meta-analysis on the Effect of Simple Compensation vs. Overcompensation on Post-complaint Satisfaction," *Marketing Letters*, 22 (1), 31-47.

Gifford, Robert and Donald W Hine (1994), "The Role of Verbal Behavior in the Encoding and Decoding of Interpersonal Dispositions," *Journal of Research in Personality*, 28 (2), 115-32.

Gittell, Jody Hoffer (2003), The Southwest Airlines Way: Using the Power of Relationships to Achieve High Performance: McGraw-Hill New York.

Goetz, Jennifer L, Dacher Keltner, and Emiliana Simon-Thomas (2010), "Compassion: An Evolutionary Analysis and Empirical Review," *Psychological bulletin* 136 (3): 351.

Gottman, John Mordechai (1979), Marital Interaction: Experimental Investigations: Academic Press New York.

Greene, William H (2008), Econometric Analysis: Pearson Education India.

Grewal, Dhruv, Anne L Roggeveen, Nancy M Puccinelli, and Charles Spence (2014), "Retail Atmospherics and In-Store Nonverbal Cues: An Introduction," *Psychology & Marketing*, 31 (7), 469-71.

Groth, Markus and Alicia Grandey (2012), "From Bad to Worse: Negative Exchange Spirals in Employee–Customer Service Interactions," *Organizational Psychology Review*, 2 (3), 208-233.

Hart, Christopher W, James L Heskett, and W Earl Sasser Jr (1989), "The Profitable Art of Service r\Recovery," *Harvard business review*, 68 (4), 148-56.

Heide, Jan B and Kenneth H Wathne (2006), "Friends, Businesspeople, and Relationship Roles: A Conceptual Framework and a Research Agenda," *Journal of Marketing*, 70 (3), 90-103.

Hennig-Thurau, Thorsten, Markus Groth, Michael Paul, and Dwayne D Gremler (2006), "Are All Smiles Created Equal? How Emotional Contagion and Emotional Labor Affect Service Relationships," *Journal of Marketing*, 70 (3), 58-73.

Heritage, John and Douglas W Maynard (2006), "Problems and Prospects in the Study of Physician-patient Interaction: 30 Years of Research," *Annual Review of Sociology*, 351-74.

Hill, Aaron D, Margaret A White, and J Craig Wallace (2014), "Unobtrusive Measurement of Psychological Constructs in Organizational Research," *Organizational Psychology Review*, 4 (2), 148-74.

Homburg, Christian, Michael Müller, and Martin Klarmann (2011), "When Should the Customer Really be King? On the Optimum Level of Salesperson Customer Orientation in Sales Encounters," *Journal of Marketing*, 75 (2), 55-74.

____, Nicole Koschate, and Wayne D Hoyer (2006), "The Role of Cognition and Affect in the formation of customer satisfaction: a dynamic perspective," *Journal of Marketing* 70 (3), 21-31.

Imada, Andrew S and Milton D Hakel (1977), "Influence of Nonverbal Communication and Rater Proximity on Impressions and Decisions in Simulated Employment Interviews," *Journal of Applied Psychology*, 62 (3), 295.

Jacobson, Robert (1990), "Unobservable Effects and Business Performance," *Marketing Science*, 9(1), 74-85.

Jones, Candace and Reut Livne-Tarandach (2008), "Designing a Frame: Rhetorical Strategies of Architects," *Journal of Organizational Behavior*, 29 (8), 1075-99.

Kelley, Scott W and Mark A Davis (1994), "Antecedents to Customer Expectations for Service Recovery," *Journal of the Academy of Marketing Science*, 22 (1), 52-61.

Kieren, Dianne K, Thomas O Maguire, and Nancy Hurlbut (1996), "A Marker Method to Test a Phasing Hypothesis in Family Problem-Solving Interaction," *Journal of Marriage and the Family*, 58 (2), 442-55.

Koenig Kellas, Jody and April R Trees (2006), "Finding Meaning in Difficult Family Experiences: Sense-Making and Interaction Processes During Joint Family Storytelling," *Journal of Family Communication*, 6 (1), 49-76.

Leigh, Thomas W and John O Summers (2002), "An Initial Evaluation of Industrial Buyers' Impressions of Salespersons' Nonverbal Cues," *Journal of Personal Selling & Sales Management*, 22 (1), 41-53.

Liao, Hui (2007), "Do It Right This Time: The Role of Employee Service Recovery Performance in Customer-Perceived Justice and Customer Loyalty After Service Failures," *Journal of Applied Psychology*, 92 (2), 475.

Loewenstein, Jeffrey, William Ocasio, and Candace Jones (2012), "Vocabularies and Vocabulary Structure: A New Approach Linking Categories, Practices, and Institutions,"*Academy of Management Annals*, 6 (1), 41-86.

Ma, Zhenfeng and Laurette Dubé (2011), "Process and Outcome Interdependency in Frontline Service Encounters," *Journal of Marketing*, 75 (3), 83-98.

Singh, Sunil, Detelina Marinova, Jagdip Singh, and Ken Evans (2016), "Service Selling Interactions: Dynamic Influcene of Salesperson's Language Cues on Customer Satisfaction," *Working Paper*.

Mattila, Anna S and Cathy A Enz (2002), "The Role Of Emotions In Service Encounters," *Journal of Service Research*, 4 (4), 268-77.

Maxham III, James G and Richard G Netemeyer (2002), "A Longitudinal Study of Complaining Customers' Evaluations of Multiple Service Failures and Recovery Efforts," *Journal of Marketing*, 66 (4), 57-71.

Maynard, Douglas W and Pamela L Hudak (2008), "Small Talk, High Stakes: Interactional Disattentiveness in the Context of Prosocial Doctor-patient Interaction," *Language in Society*, 37 (05), 661-88.

Mehrabian, Albert (1969), "Significance of Posture and Position in the Communication of Attitude and Status Relationships," *Psychological Bulletin*, 71 (5), 359.

McAlister, Leigh M, Raji Srinivasan, and Min C Kim (2007), "Advertising, Research and Development, and Systematic Risk of the Firm," *Journal of Marketing*, 71(1), 35-48.

Menon, Kalyani and Laurette Dubé (2007), "The Effect Of Emotional Provider Support on Angry Versus Anxious Consumers," *International Journal of Research in Marketing*, 24 (3), 268-75.

Mizik, Natalie (2014), "Assessing the Total Financial Performance Impact of Brand Equity With Limited Time-Series Data," *Journal of Marketing Research*, 51(6), 691-706.

____ and Robert Jacobson (2008), "The Financial Value Impact of Perceptual Brand Attributes," *Journal of Marketing Research*, 45(1), 15-32.

How Feedback Influences Persistence, Disengagement, and Change in Goal Pursuit
Montgomery, James D (1998), "Toward a Role-Theoretic Conception of Embeddedness," *American Journal of Sociology*, 104 (1), 92-125.

Nabi, Robin L, Erica N Biely, Sara J Morgan, and Carmen R Stitt (2003), "Reality-based Television Programming and the Psychology of its Appeal," *Media Psychology*, 5 (4), 303-30.

Naylor, Rebecca Walker (2007), "Nonverbal Cues-based First Impressions: Impression Formation Through Exposure to Static Images," *Marketing Letters*, 18 (3), 165-79.

Neter, John, William Wasserman, and Michael H Kutner (1989), "Applied Linear Regression Models." Richard D. Irwin, Inc, Homewood, IL

Okhuysen, Gerardo A, David Lepak, Karen Lee Ashcraft, Giuseppe Joe Labianca, Vicki Smith, and H Kevin Steensma (2013), "Theories of Work and Working Today," *Academy of Management Review*, 38 (4), 491-502.

Paul, Michael, Thorsten Hennig-Thurau, and Markus Groth (2014), "Tightening or Loosening the “Iron Cage”? The Impact of Formal and Informal Display Controls on Service Customers," *Journal of Business Research*.

Penner, Louis A, Heather Orom, Terrance L Albrecht, Melissa M Franks, Tanina S Foster, and John C Ruckdeschel (2007), "Camera-related Behaviors During Video Recorded Medical Interactions," *Journal of Nonverbal Behavior*, 31 (2), 99-117.

Perreault, William D and Laurence E Leigh (1989), "Reliability of Nominal Data Based on Qualitative Judgments," *Journal ofMarketing Research,* 26 (2), 135-148.

Peterson, Robin T (2005), "An Examination of the Relative Effectiveness of Training in Nonverbal Communication: Personal Selling Implications," *Journal of Marketing Education*, 27 (2), 143-50.

Podsakoff, Nathan P, Philip M Podsakoff, Scott B MacKenzie, and Ryan L Klinger (2013), "Are We Really Measuring What We Say We're Measuring? Using Video Techniques to Supplement Traditional Construct Validation Procedures," *Journal of Applied Psychology*, 98 (1), 99.

Puccinelli, Nancy M, Scott Motyka, and Dhruv Grewal (2010), "Can You Trust a Customer's Expression? Insights Into Nonverbal Communication in the Retail Context," *Psychology & Marketing*, 27 (10), 964-88.

Rafaeli, Anat and Robert I Sutton (1987), "Expression of Emotion as Part of the Work Role," *Academy of Management Review*, 12 (1), 23-37.

Ramani, Girish and Vipin Kumar (2008), "Interaction Orientation and Firm Performance," *Journal of Marketing* 72 (1), 27-45.

Raush, Harold L, William A Barry, Richard K Hertel, and Mary A Swain (1974), Communication Conflict and Marriage: Jossey-Bass.

Short, Jeremy C, J Christian Broberg, Claudia C Cogliser, and Keith H Brigham (2010), "Construct Validation Using Computer-Aided Text Analysis (CATA) An Illustration Using Entrepreneurial Orientation," *Organizational Research Methods*, 13 (2), 320-47.

Sirdeshmukh, Deepak, Jagdip Singh, and Barry Sabol (2002), "Consumer trust, value, and loyalty in relational exchanges,"*Journal of Marketing*, 66 (1), 15-37.

Sirianni, Nancy J, Mary Jo Bitner, Stephen W Brown, and Naomi Mandel (2013), "Branded Service Encounters: Strategically Aligning Employee Behavior with the Brand Positioning," *Journal of Marketing*, 77 (6), 108-23.

Smith, Amy K and Ruth N Bolton (1998), "An Experimental Investigation of Customer Reactions to Service Failure and Recovery Encounters Paradox or Peril?," *Journal of Service Research*, 1 (1), 65-81.

____, ____, and Janet Wagner (1999), "A Model of Customer Satisfaction with Service Encounters Involving Failure and Recovery," *Journal of Marketing Research*, 36 (3), 356-72.

Smith, Eliot R and Gün R Semin (2004), "Socially Situated Cognition: Cognition in its Social Context," *Advances in Experimental Social Psychology*, 36, 53-117.

Solomon, Michael R, Carol Surprenant, John A Czepiel, and Evelyn G Gutman (1985), "A Role Theory Perspective on Dyadic Interactions: The Service Encounter,"*Journal of Marketing*, 49 (1), 99-111.

Spector, Robert and Patrick D McCarthy (2005), The Nordstrom Way to Customer Service Excellence: A Handbook For Implementing Great Service in Your Organization: John Wiley & Sons.

Spiller, Stephen A, Gavan J Fitzsimons, John G Lynch Jr, and Gary H McClelland (2013), "Spotlights, Floodlights, and the Magic Number Zero: Simple Effects Tests in Moderated Regression," *Journal of Marketing Research*, 50 (2), 277-88.

Sprecher, Susan and Beverley Fehr (2005), “Compassionate Love for Close Others and Humanity,” *Journal of Social and Personal Relationships*, 22(5), 629-651.

Srinivasan, Raji, Gary L Lilien, and Shrihari Sridhar (2011), “Should Firms Spend More on Research and Development and Advertising during Recessions?” *Journal of Marketing,* 75(3), 49-65.

Stafford, Marla Royne (1996), "Tangibility in Services Advertising: An Investigation of Verbal Versus Visual Cues," *Journal of Advertising*, 25 (3), 13-28.

Stewart, David W, Sid Hecker, and John L Graham (1987), "It's More Than What You Say: Assessing the Influence of Nonverbal Communication in Marketing," *Psychology & Marketing*, 4 (4), 303-22.

Stoller, Gary (2005), "Companies Give Front-line Employees More Power," *USA Today*, 26.

Streukens, Sandra and Tor W Andreassen (2013), "Customer Preferences for FLE Traits: Homophily and Heterophily Effects," *Psychology & Marketing*, 30 (12), 1043-52.

Sturdy, Andrew and Peter Fleming (2003), "Talk as Technique–A Critique of the Words and Deeds Distinction in the Diffusion of Customer Service Cultures in Call Centres," *Journal of Management Studies*, 40 (4), 753-73.

Sundaram, D S and Cynthia Webster (2000), "The Role of Nonverbal Communication in Service Encounters," *Journal of Services Marketing*, 14 (5), 378-91.

Tax, Stephen S, Stephen W Brown, and Murali Chandrashekaran (1998), "Customer Evaluations of Service Complaint Experiences: Implications for Relationship Marketing,"*Journal of Marketing*, 62 (2), 60-76.

Van de Ven, Andrew H, Andre L Delbecq, and Richard Koenig Jr (1976), "Determinants of Coordination Modes Within Organizations," *American Sociological Review*, 41 (2), 322-38.

Van Dolen, Willemijn, Ko De Ruyter, and Jos Lemmink (2004), "An Empirical Assessment of the Influence of Customer Emotions and Contact Employee Performance on Encounter and Relationship Satisfaction," *Journal of Business Research*, 57 (4), 437-44.

Vargo, Stephen L and Robert F Lusch (2004), "Evolving to a New Dominant Logic for Marketing," *Journal of marketing*, 68 (1), 1-17.

Verhoef, Peter C, Katherine N Lemon, A Parasuraman, Anne Roggeveen, Michael Tsiros, and Leonard A Schlesinger (2009), "Customer Experience Creation: Determinants, Dynamics and Management Strategies," *Journal of Retailing*, 85 (1), 31-41.

Vom Lehn, Dirk (2006), "Embodying Experience: A Video-based Examination of Visitors' Conduct and Interaction in Museums," *European Journal of Marketing*, 40 (11/12), 1340-59.

Whissell, Cynthia (2009), "Using the Revised Dictionary of Affect in Language to Quantify the Emotional Undertones of Samples of Natural Language" *Psychological Reports*, 105 (2), 509-21.

Williams, Kaylene C and Rosann L Spiro (1985), "Communication Style in the Salesperson-customer Dyad," *Journal of Marketing Research*, 22 (4), 434-42.

TABLE 1.
Definition of Key Terms.

Key Terms	Definition
Solving Work	The competence and actions displayed by FLE during problem solving interactions that are indicative of FLE efforts to solve customer's problem.
Relational Work	The compassion and agreeableness displayed by FLE during problem solving interactions that are indicative of FLE efforts to foster relational bonds with the customer.
Affect	The facial, bodily, and gestural cues displayed by FLE during problem-solving interactions that are indicative of his/her feeling state (positive/negative/neutral).
CSAT	The facial, bodily and gestural cues displayed by the customer during problem-solving interactions that are indicative of his/her feeling state (positive/negative/neutral).
Problem-Solving Interaction	An encounter where a customer communicates with a FLE to address a dissatisfaction, question or concern related to the firm's product or service offerings. This study focuses on face-to-face encounters, but in general they can be mediated by technology.
Segment	A section of a problem-solving interaction obtained by splicing at naturally occurring turn-taking events during an interaction. In the Main (Insurance) study, problem-solving interactions typically involve 4-5 (2-14) segments, each 20-60 seconds in duration.
Thin-slice	A section of a problem-solving segment that is sufficient to accurately and meaningfully capture nonverbal cues related to facial, bodily or gestural expressions by the customer or FLE at any point in time. In our study, each segment is spliced into 1-9 thin slices of 5-10 seconds duration each.
Verbal Cues	Audible words used in the communications between the FLE and customer.
Nonverbal Cues	Facial expressions, bodily posture, and gestural displays used in the communications between the customer and FLE.
Test Sample	A subset of problem-solving interactions randomly sampled from the full set of problem-solving interactions for the purposes of grounded research to develop and validate measures that are contextually meaningful.
Analysis Sample	The remaining subset of problem-solving interactions (full set minus test sample) that are used for testing hypotheses.

Notes: In insurance study, CSAT is operationalized as customers feeling state of bored (1) – enthusiastic (7).

TABLE 2.
Descriptive Statistics and Correlations of Constructs (Main Study).

	Variable	1	2	3	4	5	6	7	8	9	10	11	12
1	CSAT	1											
2	Affect	.65***	1										
3	Solving Work	-.12**	-.14**	1									
4	Relational Work	-.02	-.06	.64***	1								
5	Customer Gender	.02	-.04	.08	.15**	1							
6	Customer Race	-.04	.07	.02	.13**	.05	1						
7	Customer Age	-.03	-.03	.07	.03	.18**	.12**	1					
8	Customer Dress	-.15**	-.21***	-.01	-.06	-.06	-.05	.09	1				
9	Employee Gender	.05	.16**	.03	-.01	-.14*	.06	-.11	-.07	1			
10	Employee Race	-.11**	-.16**	-.05	-.03	.14**	.28***	-.01	-.19***	-.11	1		
11	Employee Age	-.04	-.01	-.05	-.01	.07	.10	.07	.11**	-.03	-.11**	1	
12	Employee Dress	-.16**	-.27***	-.01	-.07	.04	.07	-.06	.36**	-.16**	.06	.10	1
11	Mean	3.27	3.63	6.34	4.71	.61	.20	.50	.40	.37	.14	.34	.64
12	SD	1.35	1.16	5.08	4.92	.49	.40	.50	.49	.48	.35	.48	.48

*p < .1, **p < .05, ***p < .001

TABLE 3.
Model Estimation Results (Main Study).

Variables	*Coefficient (Hypothesized Sign)*	CSAT(M_{AC}): Controls *Only* β (S.E)	CSAT(M_{AS}): Static (no time varying vars.) β (S.E)	CSAT (M_{AH}): Hypothesized β (S.E)
Intercept	β_0	2.12 (.15)***	1.29 (.45)***	1.24 (.47)***
Solving Work	β_6		.01 (.12)	-.06 (.12)
Solving Work x ST	α_1 (+)			.24 (.07)***
Solving Work x Relational Work x ST	α_5 (-)			-.13 (.06)*
Solving Work x Affect x ST	α_4 (-)			-.20 (.06)***
Relational Work	β_7		-.08 (.08)	-.11 (.09)
Relational Work x ST	α_2			.11 (.07)
Affect	β_8		.23 (.10)***	.17 (.12)
Affect x ST	α_3			.15 (.08)*
ST	β_1	-1.08 (.15)***	-.66 (.17)***	-.78 (.18)***
Lag CSAT	β_9		.32 (.11)***	.32 (.12)***
Controls				
Customer Gender	β_2	.45 (.12)	-.01 (.14)	.05 (.15)
Customer Race	β_3	-.05 (.14)	-.01 (.18)	.09 (.18)
Customer Age	β_4	.22 (.12)	-.16 (.15)	-.11 (.16)
Customer Dress	β_5	-.25 (.13)*	-.32 (.11)*	-.33 (.17)*
Employee Gender x ST	α_6	.22 (.09)	-.01 (.09)	.01 (.09)
Employee Race x ST	α_7	-1.31 (.48)*	-.71 (.33)*	-.92 (.37)***
Employee Age x ST	α_8	-.23 (.12)	-.08 (.09)	-.02 (.10)
Employee Dress x ST	α_9	-.19 (.10)	-.08 (.10)	-.04 (.12)
AIC		1046.7	762.8	761.0
Log-likelihood (df)		-511.34 (12)	-365.42 (16)	-359.50 (21)

*p < .1, **p < .05, ***p < .001

TABLE 4.
Descriptive Statistics and Correlations of Constructs (Insurance Study).

	Variable	1	2	3	4	5	6
1	CSAT	1					
2	Affect	.07**	1				
3	Solving Work	.15**	.14*	1			
4	Relational Work	.10*	.13*	.72***	1		
5	Customer Involvement	-.01	.15***	.11***	-.06**	1	
6	Household Size	-.03	.04	.15*	-.12**	.34***	1
7	Mean	4.22	4.85	5.86	5.85	5.47	4.14
8	SD	1.16	.91	4.42	5.69	.66	1.05

*p < .1, **p < .05, ***p < .001

TABLE 5.
Robustness Check (Main Study) by including the Moderating Effect of Interaction Type (Interaction type coded as NC = 1 for no CSAT change, and 0 for positive CSAT change).

	CSAT
	β (S.E)
Intercept	1.33 (.52)***
Solving Work	-.02 (.16)
Solving Work x ST	.25 (.06)***
Solving Work x Relational Work x ST	-.17 (.06)**
Solving Work x Affect x ST	-.32 (.06)***
Relational Work	-.01 (.12)
Relational Work x ST	.04 (.06)
Affect	.09 (.13)
Affect x ST	.15 (.08)
Solving Work x NC	.01 (.28)
Relational Work x NC	-.15 (.25)
Affect x NC	.12 (.27)
Solving Work x Relational Work x NC	.03 (.21)
Solving Work x Affect x NC	.26 (.21)
Solving Work x ST x NC	-.07 (.17)
Relational Work x ST x NC	.04 (.14)
Affect x ST x NC	.12 (.21)
Solving Work x Relational Work x ST x NC	.06 (.24)
Solving Work x Affect x ST x NC	.62 (.26)**
ST	-.66 (17)***
Lag CSAT	.26 (.14)
Controls	
Customer Gender	.16 (.16)
Customer Race	-.06 (.21)
Customer Age	-.19 (.16)
Customer Dress	-.36 (.18)*
Employee Gender x ST	-.02 (.08)
Employee Race x ST	-.32 (.29)**
Employee Age x ST	.05 (.10)
Employee Dress x ST	-.08 (.11)
AIC	731.9
Log-likelihood (df)	-334.93 (31)

*p < .1, **p < .05, ***p < .001
Notes: NC (Dummy variable =1 for CSAT"=" or "no resolution" interactions; 0 for CSAT"+" "resolution" interactions)

TABLE 6.
Model Estimation Results (Insurance Study).

	CSAT
	β (S.E)
Intercept	4.11 (1.07)***
Solving Work	-.09 (.13)
Solving Work x ST	.05 (.02)**
Solving Work x Relational Work x ST	-.08 (.03)***
Solving Work x Affect x ST	-.09 (.02)***
Relational Work	-.16 (.16)
Relational Work x ST	.04 (.03)
Affect	.21 (.17)
Affect x ST	-.02 (.04)
ST	.10 (.05)*
Lag CSAT	.11 (.11)
Controls	
Household Size	-.19 (.11)*
Involvement	.31 (.22)
AIC	416.4
Log-likelihood (df)	191.6 (17)

*p < .1, **p < .05, ***p < .001

Figure 1a. Effect of Solving Work over Time and at Different Levels of FLE Relational Work.

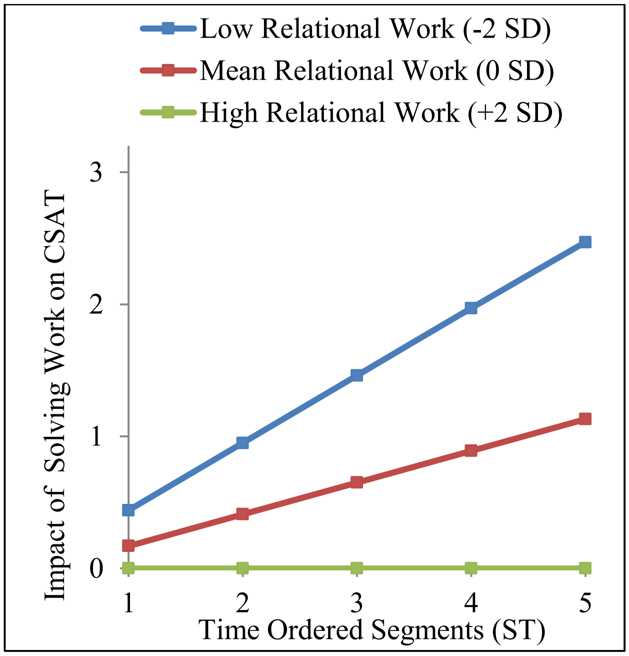
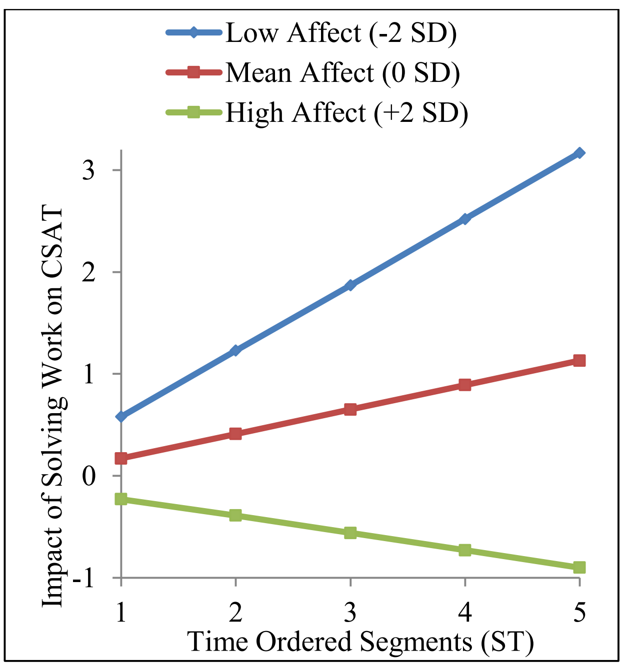


Figure 1b. Effect of Solving Work over Time and at Different Levels of FLE Affect.



Notes: "Time ordered segments" indicate interaction segments that occur sequentially in time.