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Article *in* Journal of Marketing Research · October 2009

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The goal of this article is to develop a new theory-driven scale for measuring salespeople's interpersonal-mentalizing skills—that is, a salesperson's ability to "read the minds" of customers in the sense of first recognizing customer intentionality and processing subtle interpersonal cues and then adjusting volitions accordingly. Drawing from research on autism and neuroscience, the authors develop a model of brain functioning that differentiates better-skilled from less-skilled interpersonal mentalizers. They establish the convergent, discriminant, concurrent, predictive, and nomological validities of measures of the scale using four methods in four separate studies: confirmatory factor analysis, structural equation models, multitrait–multimethod matrix procedures, and functional magnetic resonance imaging. The study is one of the first to test the validity of measures of a scale not only in traditional ways but also by adopting procedures from neuroscience.

Keywords: theory of mind, sales force behavior, functional magnetic resonance imaging, personality, construct validity

A Sales Force–Specific Theory-of-Mind Scale: Tests of Its Validity by Classical Methods and Functional Magnetic Resonance Imaging

> To predict how economic man will behave, we need to know not only that he is rational, but also how he perceives the world—what alternatives he sees and what consequences he attaches to them.
>
> —Simon (1956, p. 271)

> Ostensive [i.e., intentional] communication opens up a wide, wild, inner world of relationships and meanings, where constant gambles are being taken, and won, and lost. People with autism impervious as they are to such gambles, cannot fully participate in such a world. It may fascinate them, or terrify them, but it will not readily admit them as players. In this world the game is played by self-aware selves that have enough flying power to allow them the necessary bird's eye view.
>
> —Frith (2003, p. 216)

In his classic article, Bonoma (1982) cautions that salespeople should realize that "companies don't buy, people do," implying that it is important for salespeople to be attuned to the minds of buyers, minds that sometimes change rapidly as a consequence of group dynamics within buying centers (e.g., Dawes, Lee, and Dowling 1998). The imperative for salespeople is to immerse themselves into the nuances of the customer's organization and pay special attention to the subtle cues that customers communicate. In this way, salespeople can put themselves in the shoes of the members of the buying center and mentally simulate what customers indicate they want and why they want to buy. Following recent developments in neuroscience, we refer to such processes as "interpersonal mentalizing" (Singer and Fehr 2005). More formally, interpersonal mentalizing refers

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ISSN: 0022-2437 (print), 1547-7193 (electronic)

Journal of Marketing Research
Vol. XLVI (October 2009), 653–668

to the activity of inferring another person's beliefs, desires, risk preferences, intentions, and other mental states or events, as well as the ability to process subtle cues and adjust volitions accordingly (e.g., Frith and Frith 2003, p. 80).[1] Interpersonal mentalizing is an automatic or reflexive process that encompasses specialized regions of the brain.

The ability to engage in interpersonal mentalizing and read the minds of the customer can be linked to the adaptive-selling concept, which is a deliberative phenomenon (whereas interpersonal mentalizing is largely an automatic process) and is defined as "the altering of sales behaviors during a customer interaction or across customer interactions based upon perceived information about the nature of the selling situation which enables salespeople to tailor messages to fit individual needs and preferences" (Franke and Park 2006, p. 693; see also Spiro and Weitz 1990; Szymanski 1988). In a similar vein, Sujan, Weitz, and Kumar (1994) propose that adaptive selling is analogous to working smarter, which involves planning so as to better determine the suitability of sales behaviors and activities that will be undertaken in upcoming selling encounters. However, Sujan (1999, pp. 18–19) proposes that "[w]e need improved measures of salespeople's ability to 'read' their customers" and suggests that promising avenues for developing constructs that pertain to the perceptiveness of salespeople's observations are the ability to identify clients' needs or desires at the underlying, rather than a superficial, motive level, as well as the ability to pick up on nonverbal cues.

Several drivers have been proposed to explain why salespeople interact in adaptive ways or work smarter. One example is salespeople's incremental learning, which results in the accrual of contextual knowledge of selling contexts; that is, adaptation depends in part on knowledge of how a person's behavior shapes and is shaped by his or her interactions, which requires mental preparation and planning and a certain degree of self-efficacy with the ability to alter behavior in sales situations (Sujan, Weitz, and Kumar 1994). Individual differences in personality traits are another driver; a key individual difference in this regard is self-monitoring, which reflects the degree to which people regulate their self-presentation by altering their actions in accordance with the situational cues present in an interaction (Spiro and Weitz 1990).

The functioning of the drivers of adaptation in selling interactions rests on assumptions about and processes going on in the minds of salespeople. However, research to date has used methods based only on verbal self-reports. Advances in neuroscience have inspired recent research in related areas, such as consumer behavior (Shiv et al. 2005; Yoon et al. 2006) and economics (Camerer, Loewenstein, and Prelec 2005), and suggest that despite their complexity and relative inaccessibility, mental processes can be studied more directly.

The goal of this article is to develop a domain-specific theory-of-mind (ToM) scale (hereinafter, we call this a salesperson theory-of-mind [SToM] scale) that gauges salespeople's ability to engage in interactions with customers based on how well they take into account the intentions and other mental states and events of customers. From the scores of salespeople on the SToM scale (we describe this in greater detail subsequently), we categorize salespeople according to their theory of mind. Then, people scoring relatively high or low on the scale were asked to participate in a laboratory experiment in which their brain activity was monitored during a task that involved listening to stories designed to evoke different opportunities for taking the perspective of both customer and salesperson. Our aim is to pinpoint specific brain areas that distinguish high versus low interpersonal mentalizers and to provide a paper-and-pencil scale and managerial implications. To our knowledge, this study is the first in marketing to test the validity of a new scale using insights from neuroscience, along with traditional methods.

To accomplish this goal, we develop several ideas from neuroscience because these insights provide a different view on what might make salespeople successful during selling encounters. Then, we describe four studies that investigate the role of mentalizing in personal selling. In Study 1, our objective is to identify real situations and tasks that require interpersonal mentalizing by actual salespeople. Here, we do not study interpersonal mentalizing, per se, but rather uncover expressed skills believed to be related to interpersonal mentalizing. In other words, we investigate how interpersonal mentalizing is embodied or enacted within specific selling situations (for a similar perspective, see Zaltman 1997). Thus, we develop a paper-and-pencil measure that indirectly operationalizes interpersonal-mentalizing concepts in a selling context. We call this the SToM scale to stress the context-specific aspects of our measures and to differentiate them from a generalized ToM scale, which we develop and use to test criterion-related validity. In Study 2, we replicate the findings of Study 1 and further relate the SToM scale to performance and other variables related to interpersonal mentalizing. In both Studies 1 and 2, we investigate convergent, discriminant, and criterion-related validity. Study 2 also examines nomological validity of the measures of the SToM scale with structural equation models. Study 3 then collects data using a multitrait–multimethod matrix and uses confirmatory factor analysis (CFA) to test for the convergent and discriminant validity of measures of interpersonal mentalizing. Then, in Study 4, to identify the brain areas involved in interpersonal mentalizing and validate measures of the scale at the neural level, we use functional magnetic resonance imaging (fMRI) and experimental treatments to compare salespeople identified as high versus low in interpersonal-mentalizing skills, as measured by our scale, and to pinpoint specific differences in neural processing. Web Appendix A provides a brief primer on fMRI methodology, as well as technical details specific to Study 4 (see http://www.marketingpower.com/jmroct09).

ESSENTIALS FROM NEUROSCIENCE

Salespeople interact with customers for the purpose of understanding customer needs and designing and offering a product or service to meet those needs. The goal is to forge an understanding and a contract that potentially meets the interests of both seller and buyer. From the point of view of

[1]Other researchers have called such mental activities the application of "theory of mind" to interpret what is going on in the mind of an interaction partner (Baron-Cohen 1995; Singer and Fehr 2005).

the firm, this requires that the salesperson understands the customer's perspective and skillfully navigates negotiations to achieve a signed contract. To be effective, salespeople need to comprehend and interpret the customer's mental states and processes. Scholars characterize the aspect of mentalizing that is critical for salesperson effectiveness as follows: "the ability to generate a 'decoupled' representation of the beliefs of the customer about the world, 'decoupled' in the sense that they are decoupled from the actual state of the world and that they may or may not correspond to reality" (Singer and Fehr 2005, p. 341). We suggest that the salesperson interprets the interpersonal situation, in general, and then mentalizes about the customer, in particular, through a process of making inferences and conjectures as to the beliefs, desires, intentions, and so forth, of the customer. Interpersonal mentalizing is especially needed in such self-interested exchanges as agency contract negotiations (e.g., Bergen, Dutta, and Walker 1992) and the forming of alliances to compete more effectively in certain markets (e.g., Morgan and Hunt 1994).

Neuroscience research reveals that interpersonal mentalizing is an automatic, unconscious, and effortless process that involves the activations of a network of hard-wired brain areas or modules (which we describe subsequently) as a function of social cues emerging from interactions between people in an encounter.[2] To introduce the processes underlying interpersonal mentalizing for further discussion, we consider the following admonishment by a participant in a recent experiment in which the participant had his $10 ultimatum rejected by a player in a game:

> I did not earn any money because all the other players are *STUPID*! How can you reject a positive amount of money and prefer to get zero? They just did not understand the game! You should have stopped the experiment and explained it to them." (Camerer, Loewenstein, and Prelec 2005, p. 47)

Camerer, Loewenstein, and Prelec (2005) note that this particular respondent failed to mentalize effectively about the other party. That is, he failed to realize that many people react to what they perceive as unfair offers by rejecting them, even if by doing so they forgo any gain. Such one-sided allocations of attention to cues and formation of dysfunctional categorizations are analogous to reactions to others by people high on autistic spectrum disorders (ASD) (Camerer, Loewenstein, and Prelec 2005). People high on ASD tend to respond to social cues during interactions according to rote rules (e.g., by categorizing signals and remembering their meaning according to stereotypes or in literal senses), and as a result they frequently make mistakes in judgment in their interactions (e.g., Eckel and Wilson 2003). In other words, in an attempt to read the minds of their interlocutor, they use coarse-grained categories (akin to the categories described by Sujan, Sujan, and Bettman 1988). The coarse-grained categories might work for routine situations, but they come up short within more complex interpersonal contexts that require detailed attention to interaction partners, such that flexible, quick, and appropriate reactions can be generated to shape the conversation eventually to a person's advantage. This seems to be at the heart of Bonoma's (1982) analysis of the dynamics in buying centers and is consistent with the analysis of Singer and Fehr (2005, p. 343), who argue that "mind reading" involves the ability to understand the actual motivational state of the interaction partner, motivations that can change rapidly over time and thus require constant reinterpretation.

The way the human brain functions might help explain why coarse-grained categories dominate judgments by salespeople who seem relatively poor at interpersonal mentalizing (e.g., Camerer, Loewenstein, and Prelec 2005). Three functions are of note. First, there are specialist functions. People possess specialized brain areas or modules that have evolved to process different kinds of informational cues, such as emotions, intentions, and content related to a specific topic and goals of people with whom they interact (Pinker 1997). When a specialized brain system is triggered by particular cues, processing is rapid, and the task is relatively effortless to the person engaged. In general, people are unaware of the power and sophistication of the processes that enable them to interact with others effectively (Camerer, Loewenstein, and Prelec 2005).

Second, there are parallel modules that operate in (un)coordinated ways. Different regions of the brain operate largely in parallel and, at times, act in a concerted way, while at other times, they work at odds with each other. The functioning of these brain regions can be viewed as networks of brain activities. Ramachandran (2004) refers to this as "cross-wiring" and provides a wide range of examples of such networks. During interpersonal mentalizing, specific brain modules interact in a coordinated way to form a network. (We discuss this in greater detail subsequently.)

Third, there is the "winner-takes-all" function. The brain does not invariably integrate all the signals activated by individual groups of neurons or networks. When two distinct neural groups convey different information about the external world, the resulting perceptual judgment often adopts the information from one dominant activated neural group and suppresses or ignores the information carried by the other weakly activated neural group (Camerer, Loewenstein, and Prelec 2005).

Consistent with research in neuroscience, we suggest that salespeople low in interpersonal-mentalizing skills experience weak activation of certain specialized areas in their interpersonal-mentalizing brain network (Frith 2003). This involves low integration of the activated information in the brain and utilization of coarse-grained categories when making inferences during social interactions. Thus, for those low in interpersonal-mentalizing skills, abstract and coarse-grained categories become the key drivers for engaging in conversations (indicative of the winner-takes-all function).

Interpersonal mentalizing is a hardwired brain process that occurs spontaneously and largely unconsciously in social encounters and is centralized in a distinct network of brain regions. Research by neuroscientists shows that the most consistently activated regions with mentalizing tasks are the medial prefrontal cortex (MPFC), located in the middle of the front of the brain; the left and right temporo-parietal junctions (TPJ), located on both sides just above

[2]We use the terms "brain modules," "brain areas," "brain regions," "brain systems," and "neural substrates" interchangeably.

the ears; and the left and right temporal poles (TP), located at the bottom of the temporal lobes (e.g., Frith 2003). In the ideal case, these three areas interact with one another and cooperate as a network to form an overall interpretation of the mental states or events of another person in an interaction (Frith 2003). Table 1 presents a summary of recent findings for studies of mentalizing that implicate these three brain regions.

Drawing on a growing body of social cognitive neuroscience research, we propose that people who are high (versus low) in interpersonal-mentalizing skills will display greater coordinated activation of all three areas implicated in the interpersonal-mentalizing network during a mentalizing task. The functioning of this distinct network in the brain provides an explanation for why some salespeople are better than others at taking a bird's-eye view of an interaction and integrating the different pieces of information to their advantage.

STUDY 1: THE DEVELOPMENT OF THE SToM SCALE

To develop the SToM scale, we performed a literature search and did a content analysis of research in neuroscience and sales force behavior to find items that could be used in the scale. We then isolated different social situations and interactions in which people low in interpersonal-mentalizing ability would presumably encounter difficulties (Frith and Frith 2000). The literature suggests that people low in interpersonal-mentalizing skills exhibit several characteristics. First, they have difficulty strategically taking the initiative in conversations, which is needed to address needs, cajole, and gauge responses from customers. Second, they lack the ability to process indirect information and hints because they tend to focus on bare utterances or literal meaning and are less able to grasp and act on the ostensive meanings in communications (Soldow and Thomas 1984). A third variable differentiating high from low mentalizers is the ability to engage in mutually rewarding interactions. People with low mentalizing skills have difficulties engaging in tasks that require joint attention and reciprocity; from a salesperson's perspective, the establishment of joint attention implies that a conversational context has been created such that the salesperson and the customer cognitively elaborate on the same conversational topics to each other's advantage (see Grice's [1975] cooperative principle). Finally, people with low mentalizing skills have difficulties shaping or providing direction in conversations (Sujan, Weitz, and Kumar 1994).

Table 1
LOCATION AND FUNCTION OF BRAIN REGIONS ASSOCIATED WITH INTERPERSONAL MENTALIZING

Regions	*Summary of Findings*	*Studies*
MPFC	The MPFC is involved when people reflect on ostensive cues that might signal faking by another person; the MPFC is especially active during interpersonal-mentalizing tasks.	Grèzes, Frith, and Passingham (2004a, b), as reviewed in Amodio and Frith (2006); Fletcher et al. (1995)
	People in game theory settings take an intentional stand and interpret and predict their opponent's behavior; this involves MPFC activation.	Gallagher et al. (2002)
TPJ	The TPJ is the most consistently activated area with mentalizing tasks.	Frith and Frith (2001)
	The right TPJ especially displays selective sensitivity for the onsets of cues about mental states of others and is a key driver in constructing a coherent model of the protagonist's mind.	Saxe and Wexler (2005)
TP	Left and right TP converge for all sensory modalities. Lesion studies show that this region is particularly associated with social knowledge in the form of scripts.	Frith and Frith (2003)

Respondents and Procedures

Sales managers participating in an executive education program were asked to send questionnaires to their salespeople. One hundred seventy questionnaires were distributed. Respondents were asked to provide a unique code anonymously instead of their name and then to return the completed questionnaire using a self-addressed envelope. As compensation for completing the questionnaire, participants received a gift valued at approximately $12. For further motivation, respondents were also informed that their scores would be available to them on the Web site of the Institute for Sales and Account Management at the university that was sponsoring the project. In addition, respondents were told that following a random selection, they might be invited to participate in an fMRI study of salespeople at the university hospital. Scores on the interpersonal-mentalizing scale were not published on the Web site before the fMRI study to keep the participants unaware of their categorization of being a high or low mentalizer. We received 132 completed questionnaires (for a response rate of 78%). The sample consisted of 90% men and 10% women, their average age was 38.2 years (SD = 7.4), and their average sales experience was 9.2 years (SD = 6.2). The distribution of gender was representative of the sales force in the country in which the study was conducted.

Results

Our content analysis identified 33 items. We administered these items to the respondents, along with other measures used to investigate validity (we describe these subsequently). After pruning items due to redundancy and low intercorrelations to arrive at a manageable scale, we identified 14 potential items. An exploratory factor analysis using Promax rotation and maximum likelihood estimation yielded four factors (explained variance of 48%, Kaiser–Meyer–Olkin = .86). After eliminating one item due to cross-loadings, we ended up with 13 items (see Table 2). The four factors are as follows: (1) ability to take initiative in sales and build rapport in conversations (α = .69), (2) ability to notice subtle cues during sales encounters (α = .76), (3) ability to take a bird's-eye view and supply missing information (i.e., achieve closure) during sales encoun-

ters (α = .66), and (4) ability to shape/influence interactions with customers in a positive way (α = .79).

We correlated the four factors of the SToM scale with age and sales experience. The findings show that the four factors do not correlate significantly with age (r = –.087 to .001) or experience (r = .016 to .183). This implies that the dimensions of the SToM scale reflect more personal dispositions than learned behavior, per se.

Next, we scrutinized the validity of the measures of SToM using CFA and the partial disaggregate model (Bagozzi and Edwards 1998; Bagozzi and Heatherton 1994). We performed four analyses: (1) a four-factor CFA to establish convergent validity of the items for each factor and discriminant validity of items across factors, (2) a second-order CFA to ascertain whether the four factors load satisfactorily on one higher-order factor and thus constitute more concrete dimensions of an overall abstract construct, (3) a seven-factor CFA to examine criterion-related validity of the measures of the four-factor SToM scale with measures of a three-factor general ToM scale, and (4) an eight-factor CFA to investigate the discriminant validity of measures of the four-factor SToM scale from measures of four factors representing important variables studied by contemporary sales force management researchers (i.e., two dimensions of sales call anxiety, perspective taking ability [an aspect of empathy], and adaptiveness).

Convergent and discriminant validity of measures of the four dimensions of the SToM scale. Figure 1, Panel A, shows the results for the factor loadings for the CFA model. These loadings are high (.54 to .97) and, in conjunction with the satisfactory goodness-of-fit indexes, establish that convergent validity was achieved: Goodness-of-fit measures for Study 1 are $\chi^2(14) = 17.51$, $p = .23$; root mean square error of approximation (RMSEA) = .05; nonnormed fit index (NNFI) = .99; comparative fit index (CFI) = .99; and standardized root mean square residual (SRMR) = .04 (for definitions of these indexes, see Web Appendix B at http://www.marketingpower.com/jmroct09). Discriminant validity of the measures is apparent from the values of correlations among factors (.43 to .71). These correlations reflect corrections for attenuation due to any unreliability of measures; the raw Pearson product-moment correlations are significantly lower than these correlations. Each correlation is significantly less than 1.00 (as indicated by both confidence intervals and chi-square difference tests) and thus supports the achievement of discriminant validity for the items across the four factors. (Subsequently, we examine discriminant validity of the measures of SToM from measures of other scales.)

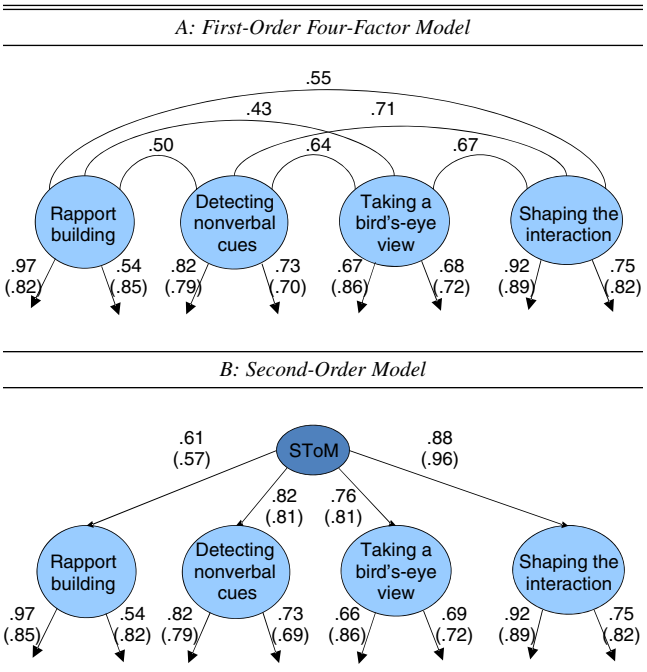
Second-order CFA model of the four dimensions of the SToM scale. Figure 1, Panel B, presents the findings for the second-order CFA of the model. The model fits well according to all the goodness-of-fit indexes: $\chi^2(16) = 17.85$, $p = .33$; RMSEA = .03; NNFI = .99; CFI = 1.00;

Table 2
THE SToM SCALE

Factor 1: Rapport Building
1. When I am with a customer (e.g., in the elevator before a sales meeting), I can easily kindle a small conversation.
2. I find it difficult to talk to a customer about topics that are not business-related. (R)
3. When at a business meeting or a reception, I can easily start off a conversation on a general topic such as the weather.
Factor 2: Detecting Nonverbal Cues
4. I find it difficult to discern the nonverbal cues of customers during a conversation. (R)
5. At times I realize that I do not pick up the hints in sales conversations; after the meeting, colleagues explain to me what happened during the conversations. Only then do I realize what happened during the conversation. (R)
6. During a sales conversation, if customers hint of something, I do take that into consideration as we are speaking together.
Factor 3: Taking a Bird's-Eye View
7. When I realize that someone does not possess the right amount of knowledge in or during a sales conversation, I can easily add some information to bring focus to the conversation, thus making it easier for people to understand what I want to say.
8. When I realize that people do not understand what I'm saying, I put what I want to say in a broader perspective in order to explain what I mean.
9. I always try to understand the industry context in which a customer operates, and by using examples from that context, I add any missing information.
10. Sometimes I summarize for customers what has been said up to that point in the meeting; this makes for a smoother conversation!
Factor 4: Shaping the Interaction
11. I make sure that I positively influence the atmosphere in a sales conversation.
12. I can easily act in ways that gives a sales conversation a positive twist.
13. I can easily make people feel more comfortable during a sales conversation.

Notes: R = reverse coded.

Figure 1
CFA MODELS AND THE RESULTS FOR THE SToM SCALE



Notes: Study 1 findings are *not* in parentheses, and Study 2 finding are in parentheses.

and SRMR = .04. The second-order and first-order factor loadings are high: Second-order loadings range from .61 to .88, and first-order loadings range from .54 to .97. These results suggest that the four dimensions of the SToM scale can be organized as distinct, concrete representations of a single, abstract concept of sales theory-of-mind thinking (i.e., interpersonal mentalizing). Subsequently, we show that a certain substructure can be differentiated.

Criterion-related validity of measures of the SToM scale. To examine the criterion-related validity of the measures of the SToM scale, we performed a seven-factor CFA of the measures of the SToM scale and the measures of a ToM scale consisting of three factors. The measures of ToM comprised ten items according to the criteria proposed by Frith and Frith (2000) and pertaining to generalized interpersonal-mentalizing ability (see Web Appendix C at http://www.marketingpower.com/jmroct09). For the data in Study 1, we administered these items to the sample of salespeople, factor analyzed them, and found three factors corresponding to three of the four factors for our sales-specific scale (the exploratory factor analyses of the generalized ToM scale are available on request). The three ToM factors capture, respectively, (1) the ability to take initiative in interactions and build rapport (corresponding to our $SToM_1$, rapport building), (2) the ability to process indirect information and hints in conversations (corresponding to our $SToM_2$ subscale, detecting nonverbal cues), and (3) the ability to cooperate in and coordinate interactions to achieve closure (corresponding to our $SToM_3$, taking a bird's-eye view). The literature on interpersonal mentalizing does not address our fourth scale factor (shaping the interaction), but we expect all three ToM dimensions to be correlated with $SToM_4$ because such an ability is likely to be dependent on the skills summarized by the three ToM dimensions. Overall, the CFA model fits well in Study 1, according to the goodness-of-fit indexes: $\chi^2(56) = 60.91$, $p = .30$; RMSEA = .02; NNFI = .99; CFI = 1.00; and SRMR = .05. The relevant correlations appear in Table 3 in the entries below the main diagonal and are highlighted in boldface type. As we hypothesized, ToM_1 and $SToM_1$ are highly correlated (.90), ToM_2 and $SToM_2$ are highly correlated (.90), and ToM_3 correlates moderately highly with $SToM_3$ (.45). Positive correlations between $SToM_4$ and ToM_1–ToM_3 also occur, as we expected (.39, .63, and .18). In summary, the measures of the sales-specific SToM scale factors achieve criterion-related validity with the measures of the generalized ToM scale factors.

Discriminant validity of measures of dimensions of SToM scale, from measures of other scales. We investigated the discriminant validity between measures of the four dimensions of the SToM scale and measures of three other scales that should be related to the SToM scale, but in theory measure different constructs. One of the other scales is a social anxiety scale, which was developed by Watson and Friend (1969) and is composed of 12 items. We chose social anxiety because it is a common emotion felt by salespeople and should be negatively related to the four dimensions of the SToM scale. A study by Ramachandran and Oberman (2006) investigating people high on ASD supports our conjecture. Verbeke and Bagozzi (2000) show the effects of social anxiety in a sales force but do not examine interpersonal mentalizing as we do here. The social anxiety scale we use has two dimensions that were highly correlated (r = .68).

The second scale we used measured perspective taking (i.e., a person's ability to put him- or herself in the place of another), which is one aspect of empathy. We used Davis's (1983) six-item scale and expected that the dimensions of the SToM scale would be positively correlated with perspective taking.

Third, we used Spiro and Weitz's (1990) 16-item adaptive selling scale and predicted that adaptiveness would be positively correlated with the dimensions of the SToM scale. Spiro and Weitz propose theoretically that adaptiveness consists of six facets, but the CFA they run on their data shows that the scale was not unidimensional. Nevertheless, they treat their scale as a unidimensional scale, which obscures differences among facets and violates psychometric principles of measurement, making any predictions based on the scale ambiguous. Moreover, their 16-item scale contains 7 items for Facet 6 and only between 0 and 3 items each for Facets 1–5. As a consequence, we operationalized adaptiveness with 6 of the 7 items for Facet 6, which Spiro and Weitz (1990, p. 62) define as "actual use of different approaches in different situations" and measure globally with general statements, such as "I am very flexible in the selling approach I use" (we dropped 1 item from their Facet 6 measures because it was too transparently redundant with one or more of the others). The six adaptiveness measures we used achieved unidimensionality.

Table 4 presents the findings. The model fits well according to the goodness-of-fit indexes: $\chi^2(76) = 95.26$, $p = .07$; RMSEA = .04; NNFI = .98; CFI = .99; and SRMR = .05. The four dimensions of SToM correlate negatively with social anxiety (range: –.22 to –.53) and positively with perspective taking (range: .27 to .40) and adaptiveness (range: .46 to .61), as we hypothesized. Yet the

Table 3
SUMMARY OF FINDINGS FOR STUDIES 1 AND 2: CRITERION-RELATED VALIDITY, ToM, AND SToM

	Parameter Estimates for Factor Intercorrelation Matrix						
	1	*2*	*3*	*4*	*5*	*6*	*7*
1. ToM_1: rapport building	1.00	.41	.35	**.97**	**.**52	.57	**.61**
2. ToM_2: detecting nonverbal cues	.37	1.00	.68	**.**16	**.87**	.68	**.61**
3. ToM_3: taking a bird's-eye view	.13	.45	1.00	.22	.62	**.48**	**.42**
4. $SToM_1$: rapport building	**.90**	**.**52	.08	1.00	.33	.44	.57
5. $SToM_2$: detecting nonverbal uses	.40	**.90**	.24	.54	1.00	.66	.73
6. $SToM_3$: taking a bird's-eye view	.33	.43	**.45**	.44	.61	1.00	.75
7. $SToM_4$: shaping the interaction	**.39**	**.63**	**.18**	.56	.69	.63	1.00

Table 4
SUMMARY OF FINDINGS FOR STUDIES 1 AND 2: DISCRIMINANT VALIDITY FOR STOM, ANXIETY, PERSPECTIVE TAKING, AND ADAPTIVENESS

	Parameter Estimates for Factor Intercorrelation Matrix								
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
1. Social anxiety1	1.00	—	–.19	–.37	**–.38**	**–.23**	**–.24**	**–.29**	–.35
2. Social anxiety2	.68	1.00	—	—	**—**	**—**	**—**	**—**	—
3. Perspective taking	–.40	–.13	1.00	.38	**.28**	**.33**	**.32**	**.33**	.25
4. Adaptiveness	–.33	–.34	.23	1.00	**.46**	**.78**	**.75**	**.70**	.49
5. $STOM_1$: rapport building	**–.32**	**–.22**	**.28**	**.46**	1.00	.34	.44	.58	.31
6. $STOM_2$: detecting nonverbal cues	**–.43**	**–.26**	**.40**	**.61**	.53	1.00	.72	.75	.56
7. $STOM_3$: taking a bird's-eye view	**–.53**	**–.29**	**.39**	**.49**	.45	.64	1.00	.75	.31
8. $STOM_4$: shaping the interaction	**–.31**	**–.22**	**.27**	**.49**	.58	.71	.66	1.00	.48
9. Performance	**—**	**—**	**—**	**—**	—	—	—	—	1.80

Notes: Study 1 appears below the diagonal, and Study 2 appears above the diagonal. In Study 2, all anxiety items loaded on one factor. Bold entries denote discriminant validity correlations.

correlations are significantly less than 1.00 and therefore demonstrate that the measures of SToM are distinct from the measures of social anxiety, perspective taking, and adaptiveness.

Discussion

We show that the domain-specific SToM scale consists of four distinct factors, in which measures achieve convergent validity within factors and discriminant validity between factors. Furthermore, as our second-order CFA shows, the four SToM factors can be considered reflective of a single, higher-order abstract representation of SToM with four dimensions. Next, we show that the four SToM dimensions achieve criterion-related validity in the sense of systematically correlating with measures of generalized theory-of-mind skills. Finally, we show that the measures of the four SToM dimensions are distinct from measures of social anxiety, perspective taking, and adaptiveness. In Study 2, we attempt to replicate these findings in a new sample of salespeople and, at the same time, demonstrate that the dimensions of SToM are related to performance.

STUDY 2: REPLICATION AND TEST OF PREDICTIVE VALIDITY OF THE STOM SCALE

We administered the measures of SToM, ToM, social anxiety, perspective taking, and adaptiveness to a new sample of salespeople. In addition, we obtained measures of performance. Finally, using an additional sample of sales managers and their salespeople, we validated the performance measures. We investigated convergent, discriminant, criterion-related, and predictive validity of the measures of SToM.

Respondents and Procedures

We surveyed 126 salespeople who were students and coworkers of the students at an executive education program at a cooperating university. The sample consisted of 91% men and 9% women, the average age was 40.0 years (SD = 9.0), and the average experience in sales was 12.3 years (SD = 7.8).

In Study 2, we administered the same items used in Study 1. In addition, we used six items from Behrman and Perrault's (1982) performance scale. The six items focus on sales volume, sales quota, selling new products, sales by key accounts, building and maintaining long-term relationships with customers, and profit contributions. Each item asked salespeople to rank themselves on a ten-point scale, where 1 = "bottom 10%" and 10 = "top 10%" in sales compared with all salespeople in their company.

Results

Convergent and discriminant validity of measures of the four dimensions of the SToM scale. Figure 1, Panel A, shows the factor loadings for the four SToM factors. All loadings are high (.70 to .89). The high loadings and satisfactory fit of the CFA model support convergent validity: $\chi^2(14) = 17.66$, $p = .22$; RMSEA = .04; NNFI = .99; CFI = .99; and SRMR = .02. We also achieved discriminant validity; the correlations among the factors range from .33 to .77 and are all significantly less than 1.00. Subsequently, we examine the discriminant validity of the measures of SToM from measures of other scales.

Second-order CFA model of the four dimensions of the SToM scale. Figure 1, Panel B, presents the findings for the second-order CFA model. This model fits well according to all the goodness-of-fit indexes, and the second-order and first-order factor loadings are high: Second-order loadings range from .57 to .96, and first-order loadings range from .69 to .89: $\chi^2(16) = 22.68$, $p = .12$; RMSEA = .056; NNFI = .99; CFI = .99; and SRMR = .04. These results suggest that the four dimensions of the SToM scale can be organized as distinct, concrete representations of a single, abstract concept of sales theory-of-mind thinking (i.e., interpersonal mentalizing). Subsequently, we examine a particular substructure.

Criterion-related validity of measures of the SToM scale. The findings for the seven-factor CFA of the measures of the SToM scale and the measures of the ToM scale appear in Table 3. The model fits well overall: $\chi^2(56) = 99.54$, $p = .00$; RMSEA = .066; NNFI = .96; CFI = .98; and SRMR = .05. The entries in the correlations matrix above the diagonal address criterion-related validity. As we hypothesized, ToM_1 and $STOM_1$ are highly correlated (.97), ToM_2 and $STOM_2$ are highly correlated (.87), and ToM_3 is moderately correlated with $STOM_3$ (.48). Positive correlations between $STOM_4$ and ToM_1–ToM_3 also occur, as we predicted (.61, .61, and .42). In summary, the measures of the sales-specific SToM scale factors achieve criterion-related

validity with the measures of the generalized ToM scale factors.

Discriminant validity of measures of dimensions of the SToM scale from measures of other scales. Table 4 presents the results for this test of discriminant validity. The overall fit of the model is good: $\chi^2(56) = 75.18$, $p = .05$; RMSEA = .04; NNFI = .98; CFI = .99; and SRMR = .04. The four dimensions of SToM correlate negatively with social anxiety (range: –.23 to –.38) and positively with perspective taking (range: .28 to .33) and adaptiveness (range: .46 to .78), as we forecasted. Yet the correlations are significantly less than 1.00, thus demonstrating that the measures of SToM are distinct from the measures of social anxiety, perspective taking, and adaptiveness.

Predictive validity. Table 4 also presents the correlations between the four SToM factors and anxiety, perspective taking, adaptiveness, and performance factors (see the final column). Performance correlated .31, .56, .31, and .48 with the four respective SToM factors; –.35 with anxiety; .25 with perspective taking; and .49 with adaptiveness. This establishes the bivariate predictive validity of the measures of the SToM scale.

Validation of performance measures. We asked 40 managers at a sales conference to distribute questionnaires to their top and bottom performers. We asked them to give at least two questionnaires each to top and bottom performers and up to ten if possible. A total of 200 questionnaires were distributed, with 100 to top performers and 100 to bottom performers. We defined top and bottom performers in terms of their ability to achieve high sales, meet quotas, build and maintain relationships with customers, and acquire profitable accounts. The questionnaires contained the same six performance items used in the replication and predictive validity study discussed previously, and they were embedded with many other questions, which helped disguise the purpose of our study. A total of 102 questionnaires were returned: 57 top performers (57% response rate) and 45 bottom performers (45% response rate).

A t-test on the equality of mean performance across top and bottom performers showed that the six performance items indeed differentiate between high and low performers: $M_{High} = 7.70$ versus $M_{Low} = 6.95$, $t = 4.19$. Thus, evidence suggests that the scale items we used from Behrman and Perreault (1982) are related to actual performance.

Discussion

The SToM measures, which consisted of four distinct dimensions and loaded on one second-order factor, achieved convergent and discriminant validity in a new sample of salespeople and achieved criterion-related validity as well. Moreover the measures of the four dimensions of SToM were distinct from the measures of social anxiety, perspective taking, and adaptiveness.

STUDY 3: CONSTRUCT VALIDITY BY THE MULTITRAIT–MULTIMETHOD MATRIX APPROACH AND NOMOLOGICAL VALIDITY

Studies 1 and 2 examined aspects of validity for the SToM scale but did so using only a single method. In Study 3, we perform a true construct validity assessment using CFA applied to data gathered by two methods: a "does not describe me/describes me completely" scale and a "disagree/agree" scale, both measured with seven-point items. We obtained the sample, which included 132 salespeople, using methods similar to that employed in Study 2: average age was 38.3 years (SD = 8.9 years), and 80% were men and 20% were women.

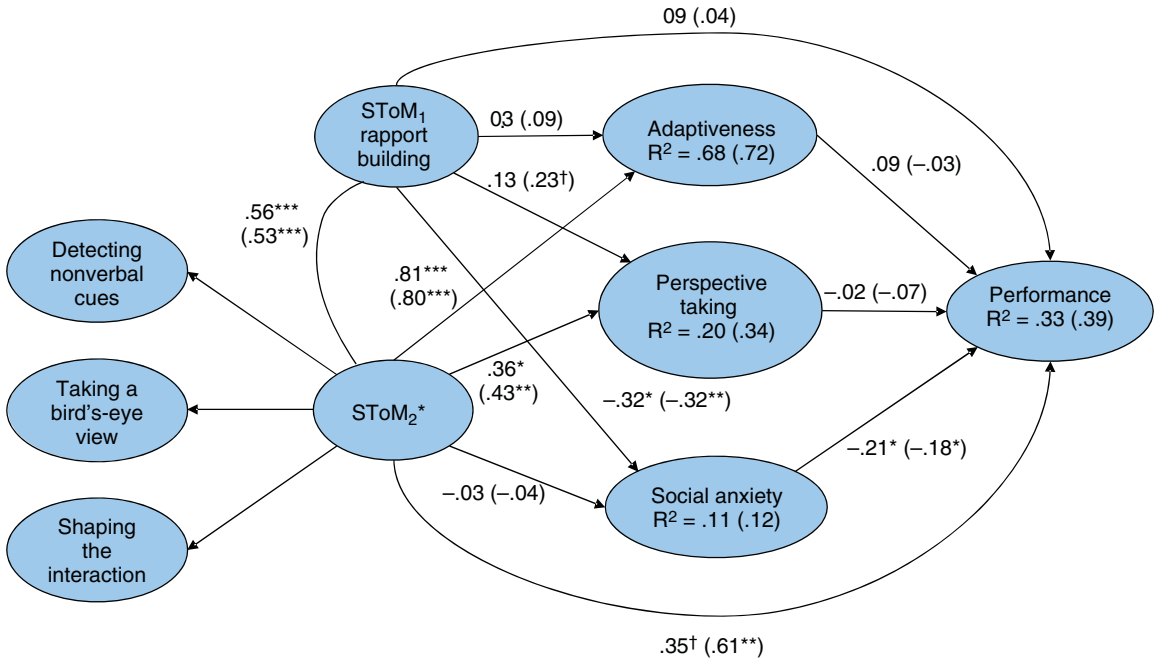
The resulting multitrait–multimethod matrix that we formed consists of two indicators by each method for each SToM factor ("traits"). This yields a 16×16 matrix of correlations. Application of a six-factor CFA model (four SToM traits and two method factors) showed that the two method factors were highly correlated, after correction for attenuation ($\phi = .96$, SE = .04). Therefore, we ran a five-factor CFA model (four SToM traits and one method factor). This model showed a good fit to the data: $\chi^2(82) = 169.55$, $p = .00$; RMSEA = .08; NNFI = .97; CFI = .98; and SRMR = .04. Trait variance ranged from .46 to .85 (average = .66), and of the 16 measures, only 1 ($STOM_{3a}$) yielded less than 50% trait variance, and even then only slightly below the .50 standard. Random error variance ranged from .00 to .49 (average = .25), which is low. Method variance ranged from .00 to .44 (average = .09), which is also low; indeed, only 1 of 16 method factor loadings was significant. Overall, the construct validity of the measures of the SToM scale, in terms of convergent validity, is excellent.

We also achieved discriminant validity for the measures of the SToM scale. The respective correlations of $STOM_1$ with $STOM_2$–$STOM_4$ were .40 (SE = .08), .49 (SE = .08), and .55 (SE = .07). Furthermore, $STOM_2$ correlated .79 (SE = .04) and .76 (SE = .04) with $STOM_3$ and $STOM_4$, respectively, and $STOM_3$ and $STOM_4$ correlated .78 (SE = .08). These correlations, which we corrected for attenuation and therefore are higher than the raw Pearson product-moment correlations, fall far and significantly below 1.00, thus demonstrating discriminant validity for the measures of SToM.

We also investigated predictive validity in a multivariate sense (sometimes also called "nomological validity") by examining a structural equation model in which two SToM factors (a first-order factor for rapport building and a second-order factor for detecting nonverbal cues, taking a bird's-eye view, and shaping the interaction) predicted adaptiveness, perspective taking, social anxiety, and performance, and in turn, adaptiveness, perspective taking, and social anxiety also predicted performance (see Figure 2). The two SToM factors represent intangible relational and instrumental aspects of sales theory of mind, respectively. Tables 3 and 4 show that the correlations among the four SToM factors are consistent with such an interpretation in that $STOM_2$–$STOM_4$ correlated highly and uniformly with each other, while $STOM_1$ correlated moderately with $STOM_2$–$STOM_4$.

Because we used two methods to measure SToM, adaptiveness, perspective taking, and social anxiety, we ran the structural equation model shown in Figure 2 twice, once for each method. For Method 1, the overall model fits well: $\chi^2(86) = 142.20$, $p = .00$; RMSEA = .07; NNFI = .97; CFI = .98; and SRMR = .05. Figure 2 shows that rapport building influences performance through social anxiety; specifically, the greater the rapport building, the lower is the social anxiety, and the greater is the performance. The only other effect on performance is a direct effect from

Figure 2
FINDINGS FOR THE PREDICTIVE VALIDITY MODEL IN STUDY 2



*$p < .05$.
**$p < .01$.
***$p < .001$.
†$p < .08$.

Notes: Method 1 results are *not* in parentheses, and Method 2 results are in parentheses. $STOM_2$* refers to a second-order sales theory-of-mind factor for which the three first-order factors shown load on this factor. All ellipses designate first-order factors, except for $STOM_2$*, which is a second-order factor. We omit all measures, factor loadings, and error variances from the figure for simplicity. Coefficients in the figure are standardized regression parameters.

$STOM_2$* (the second-order factor with first-order $STOM_2$–$STOM_4$ factors loading on it), in which the greater the $STOM_2$*, the greater is the performance (here, the effect only approaches significance: $\beta = .35$, $t = 1.76$). The other notable results include the dependence of adaptiveness and perspective taking on $STOM_2$* and the dependence of social anxiety on $STOM_1$. For Method 2, the overall model also fits well: $\chi^2(86) = 135.66$, $p = .00$; RMSEA = .06; NNFI = .98; CFI = .98; and SRMR = .04. As Figure 2 shows, rapport building again influences performance indirectly through social anxiety. Here, $STOM_2$* has a strong direct effect on performance ($\beta = .61$, $t = 2.97$). Similar to Method 1 findings, we again observe that adaptiveness and perspective taking are dependent on $STOM_2$*, and social anxiety is dependent on rapport building.

In summary, STOM processes are the primary drivers of performance, such that $STOM_1$ (i.e., rapport building) indirectly (through social anxiety) and $STOM_2$* (the second-order factor on which $STOM_2$–$STOM_4$ load) directly influence performance. Greater rapport building apparently reduces social anxiety, and the less the social anxiety, the greater is the performance. The instrumentality of $STOM_2$* functions to affect performance straightforwardly. Adaptiveness (which we measured with overall or summary measures) and perspective taking are dependent on STOM processes but have no effects on performance beyond the more basic STOM processes. To validate the STOM scale and better understand the bases for interpersonal mentalizing, we turn now to our study of salespeople's brain processes.

STUDY 4: DO DIFFERENT PATTERNS OF BRAIN ACTIVITY OCCUR BETWEEN HIGH- AND LOW-INTERPERSONAL-MENTALIZING SALESPEOPLE DURING INTERPERSONAL-MENTALIZING TASKS?

To the extent that the STOM scale measures salespeople's ability to interpersonally mentalize, we would expect to observe different patterns of brain activity between salespeople scoring high and those scoring low on interpersonal-mentalizing tasks. More specifically, in line with the recent research of neuroscientists with autistic and normal people, we would expect that high (versus low) scorers on the STOM scale would display greater activation in the MPFC, TPJ, and TP regions (e.g., Amodio and Frith 2006; Castelli et al. 2002; Frith and Frith 2003). Thus, we propose the following:

Hypothesis: A comparison of the brain activity between salespeople who are high and those who are low on interpersonal-mentalizing ability during the performance of a mentalizing task (relative to performance on a nonmentalizing task) will show greater activations of the MPFC, TPJ, and TP.

Participants

From the sample of 132 salespeople in Study 1, 20 right-handed men were recruited for the fMRI study. Table 5 presents the means, standard deviations, and t-tests for comparison of high versus low scorers on the SToM scale across various criteria. High- versus low-scoring participants differed on all four dimensions of SToM. High and low scorers on the SToM scale did not differ in age or experience, but they differed, as expected, on the other scales. The high-interpersonal-mentalizing (high-IM) group scored higher on adaptive selling and perspective taking and lower on social anxiety than the low-IM group.

Method and Materials

The purpose and design protocol for the experiment were approved by the appropriate institutional review board, and all participants gave written informed consent. The stories serving as stimuli were presented auditorily, consistent with the method used by Nieminen-Von Wendt and colleagues (2003).

The fMRI protocol consisted of three experimental conditions: interpersonal mentalizing, process, and unlinked sentences. Participants listened to five stories of each type presented in one of two counterbalanced orders. Interpersonal mentalizing is the critical condition, in which the cognitive task involves the use of theory of mind to understand why and how the characters in the story interact. The process condition serves as a closely matching control condition, in which the cognitive task involves nearly the same cognitive processes as in the interpersonal-mentalizing condition, with the exception that the stories do not explicitly require the use of theory of mind to understand why and how the characters operate or interact. Finally, in the unlinked-sentences condition, participants listened to a series of sentences that did not form a coherent story. The unlinked-sentences condition serves as a baseline control condition, in which the cognitive task involves the use of language and memory. Under each experimental condition, every story was followed by a question that the respondent was asked to answer silently to him- or herself. The number of words and types of words in the stories were distributed as evenly as possible over the different conditions. The stimuli were presented in the participant's mother tongue; an English translation appears in Web Appendix D (http://www.marketingpower.com/jmroct09). Durations of the stories, including the questions, were between 33 and 36 seconds and, on average, were equivalent in terms of time length across the three experimental conditions. Each participant was then given approximately 6 seconds to think about an answer for each question following the presentation of a story.

A separate group of 25 respondents who were informed about the purpose of the study were asked to evaluate the 15 scenarios. After being given definitions of the stimuli, the respondents identified each of the 15 scenarios as being interpersonal-mentalizing, process, or unlinked-sentence scenarios. They were also asked to describe the scenarios and were recorded as having given a correct response if their descriptions were sensible and could be interpreted. Finally, they rated on ten-point scales their own confidence in the classification and how clear they believed the scenarios were. The three respective scenarios were correctly classified with 96.8%, 99.2%, and 99.2% accuracy. Answers to the stories were correct for 92.0%, 95.6%, and 100% of interpretations, respectively. The respective average confidence ratings were 8.26 (SD = .94), 8.22 (SD = 1.16), and 9.54 (SD = .72). The average clarity ratings were 8.16 (SD = 1.12) for the interpersonal-mentalizing and 7.86 (SD = 1.15) for the process scenarios. Clarity ratings for unlinked sentence scenario were not meaningful given their nature.

Functional Image Analysis

Imaging was conducted using a full-body 3.0 T General Electric scanner fitted with an eight-channel receive-only head coil. For the structural imaging, a high-resolution image of the brain was acquired with a three-dimensional T1-weighted inversion recovery fast spoiled gradient recalled echo sequence (echo time [TE]/repetition time [TR]/inversion time = 2.1/10.4/300 milliseconds, flip angle = 18°, matrix = 416 × 256, field of view [FOV] = 25 centimeters, slice thickness 1.6 millimeters with 50% overlap). For the functional imaging, we obtained a time series of 210 volumes with 39 slices in the transverse plane using single-shot gradient echo planar imaging (TR = 3000 mil-

Table 5
DESCRIPTIVE STATISTICS FOR STUDY 4 PARTICIPANTS BY SToM SCALE SCORES

	High SToM Scorers (n =10)		*Low SToM Scorers (n = 10)*		
	M	*(SD)*	*M*	*(SD)*	*t-Statistic*
Age (years)	34.20	(7.52)	40.10	(10.05)	–1.49
Experience in sales (years)	8.30	(4.55)	9.90	(7.50)	.22
SToM	6.45	(.33)	5.18	(.40)	7.79***
$SToM_1$: rapport building	6.53	(.57)	4.67	(.85)	5.78***
$SToM_2$: detecting nonverbal cues	6.43	(.39)	5.37	(.82)	3.71**
$SToM_3$: taking a bird's-eye view	6.45	(.40)	5.47	(.70)	3.81**
$SToM_4$: shaping the interaction	6.37	(.40)	5.10	(.86)	4.22**
Adaptive selling	6.32	(.44)	5.14	(.64)	4.85***
Social anxiety	2.08	(.66)	3.63	(.71)	–5.07***
Perspective taking	5.43	(.66)	4.45	(.85)	2.99*

*$p < .05$.
**$p < .005$.
***$p < .001$.
Notes: All participants are right-handed men.

liseconds, TE = 30 milliseconds, flip angle = 75°, resolution = 3.5 millimeters × 3.44 millimeters × 2.3 millimeters, and FOV = 22 centimeters).

During the functional run, a new story was presented every 42 seconds, and volume acquisitions were made during the entire 42-second periods. This resulted in 14 whole-brain fMRI volume acquisitions per story, of which the first 13 were used for analysis (we excluded the last volume from analyses because during this period, participants heard three beeps, which signaled an interstimulus interval).

We preprocessed and analyzed functional image data using statistical parametric mapping (SPM2). Linear image realignment, coregistration, nonlinear normalization to stereotactic anatomical space (MNI), and spatial smoothing three-dimensional Gaussian kernel 8-millimeter full-width at half maximum (FWHM) were performed for each participant using standard statistical parametric mapping methods. A high-pass (cutoff period, 250 seconds) frequency filter was applied to the time series.

In line with our hypothesis, we predicted greater activations for high- versus low-IM people in the regions implicated in mentalizing—specifically, the MPFC, TPJ, and TP. We first tested the hypothesis conservatively with a random-effects group analysis at coordinates defined by previous studies and then in an explorative way by searching for groups of voxels in which the activity across participants correlates with the individual SToM measures. Because the predictions were limited to specific anatomical regions, we adopted a region-of-interest approach. Such an approach tests the contrasts only in those specific regions rather than across the entire brain and, by reducing the degree of correction needed for multiple comparisons, allows greater sensitivity in detecting effects. Thus, small-volume corrections (SVC; Worsley et al. 1996) were applied to the three a priori regions of interest. The MPFC region was defined using MARINA software (Walter et al. 2003), which has predefined anatomical regions that can be used as masks. The MPFC mask consisted of the MARINA "left and right superior frontal gyrus, medial" regions. For the TPJ and TP regions, we used a sphere with a ten-millimeter radius in line with the coordinates of previous studies. We used the coordinates from the results of Saxe and Wexler's (2005) study for TPJ (centered at x = 54, y = –54, z = 14 and x = –48, y = –60, z = 21 for right and left, respectively) and those from Fletcher and colleagues' (1995) study for TP (centered at x = 44, y = 18, z = –16 and x = –44, y = 20, z = –16 for right and left, respectively). Before using SVC, we transformed coordinates given in these studies from Talairach space to MNI space (www.mrc-cbu.cam.ac.uk). We then tested the contrasts of interest in these regions in a second-level random-effects group analysis.

For the correlational analysis, we extracted the mean percentage signal change associated with interpersonal mentalizing compared with the process condition and compared with the unlinked-sentences condition, and then we examined their correlations with participants' SToM scores. The sizes of the regions of interest are larger for the correlational analysis and were created with WFU Pickatlas software toolbox by selecting the left and right temporal lobes and the MPFC. Unless otherwise specified, all results were threshold at $p = .005$ (uncorrected) with a cluster size greater than k = 10. We chose this cluster size to ensure that all activations were at least two contiguous voxels in acquired space.

In line with our hypothesis, we expected that the areas implicated in mentalizing (i.e., MPFC, TPJ, and TP) would be more strongly activated in high-IM participants than in low-IM participants. As a test of our hypothesis, we conducted a comparison between high-IM and low-IM groups for the interpersonal-mentalizing-versus-process condition and the interpersonal-mentalizing-versus-unlinked-sentences condition.

As we predicted, the test of the interpersonal-mentalizing-versus-process condition revealed more activation of the MPFC and the TPJ (for significant interaction effects, see Table 6, Panel A). However, we obtained no difference for

Table 6
FOCI OF INCREASED ACTIVATION FOR CONTRASTS

A: Activations Related to Interpersonal-Mentalizing-Versus-Process Task Contrasts

Anatomical Region	MNI Coordinates						Statistical Effects		
	L/R	*x*	*y*	*z*	*Z-Value*	*Cluster Size (k)*	*IM*	*T*	*IM × T*
MPFC	R	10	58	20	3.86	64	n.s.	$F(2, 36) = 19.10$, $p < .001$	$F(2, 36) = 3.95$, $p < .05$
MPFC	R	2	48	42	3.60	30	n.s.	$F(2, 36) = 13.86$, $p < .001$	$F(2, 36) = 2.00$, $p < .10$
MPFC	L	–14	48	36	3.71	60	n.s.	$F(2, 36) = 11.57$, $p < .001$	$F(2, 36) = 5.37$, $p < .01$
TPJ	R	62	–46	4	3.35	18	$F(1, 18) = 5.39$, $p < .05$	$F(2, 36) = 14.95$, $p < .001$	$F(2, 36) = 3.92$, $p < .05$

B: Activations Related to Interpersonal-Mentalizing-Versus-Unlinked-Sentences Task Contrasts

Anatomical Region	MNI Coordinates						Statistical Effects		
	L/R	*x*	*y*	*z*	*Z-value*	*Cluster Size (k)*	*IM*	*T*	*IM × T*
MPFC	L	–14	52	34	3.77	51	n.s.	$F(2, 36) = 14.09$, $p < .001$	$F(2, 36) = 5.47$, $p < .01$
TPJ/superior temporal sulcus	R	64	–44	6	4.20	46	$F(1, 18) = 5.29$, $p < .05$	$F(2, 36) = 18.62$, $p < .001$	$F(2, 36) = 4.73$, $p < .05$

Notes: IM = interpersonal-mentalizing group (high versus low), T = task, L = left, R = right, and n.s. = not significant.

the TP. In the interpersonal-mentalizing-versus-process condition, three clusters in the MPFC were significantly more activated in the high-IM group than in the low-IM group. Compared with the low-IM group, the high-IM group also displayed greater levels of activation in the MPFC when performing the interpersonal-mentalizing-versus-the-unlinked-sentences task (see Table 6, Panel B). In addition, the high-IM group showed greater activation in the right TPJ than the low-IM group in the interpersonal-mentalizing-versus-process test (see Table 6, Panel A) and in the interpersonal-mentalizing-versus-unlinked-sentences test (see Table 6, Panel B).

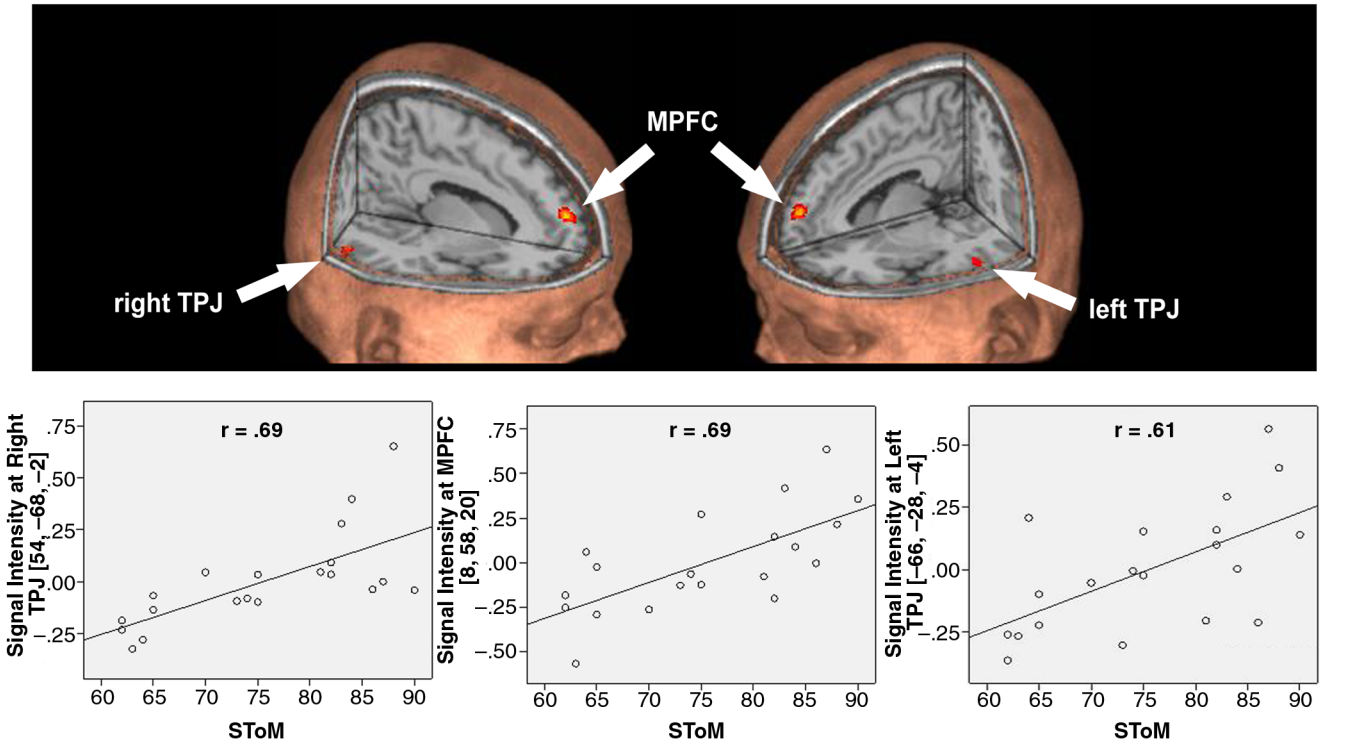
Comparison between high-IM and low-IM groups for the contrast of both interpersonal mentalizing versus process and interpersonal mentalizing versus unlinked sentences did not yield significant effects in the TP region. Furthermore, in a comparison of the low-IM group and the high-IM group, none of the areas associated with mentalizing were more active in the low-IM group.

As a further test of our hypothesis, we performed a correlational analysis between the individual SToM scores and the activity in the interpersonal-mentalizing-versus-process condition and the interpersonal-mentalizing-versus-unlinked-sentences condition. The results revealed three areas in which the activity showed significant, positive correlations with SToM scores for the interpersonal-mentalizing-versus-process condition: right MPFC ([8 58 20], r = .69, $p < .005$), right TPJ ([54 –68 –2], r = .69, $p < .005$), and left TPJ ([–66 –28 –4], r = .61, $p < .005$) (see Figure 3). Two clusters in the left and right TP show a similar but nonsignificant trend in terms of correlations with SToM scores for the interpersonal-mentalizing-versus-process condition: left TP ([–38, 10, –30], r = .52, $p < .05$) and right TP ([48, 2, –8], r = .45, $p < .05$). Significant, positive correlations were also found with SToM scores for the interpersonal-mentalizing-versus-unlinked-sentences condition in the following regions: left TPJ ([–64 –28 –4], r = .67, $p < .005$), left TPJ/superior temporal sulcus ([–60 –12 4], r = .63, $p < .005$), and right TPJ ([64 –42 6], r = .60, $p < .01$). Two small clusters in the MPFC showed a similar trend in terms of correlations with SToM scores for the interpersonal-mentalizing-versus-unlinked-sentences condition, but the cluster sizes were smaller than ten voxels. Furthermore, for both contrasts (i.e., interpersonal mentalizing versus process and interpersonal mentalizing versus unlinked sentences), none of the regions showed a negative correlation with SToM measures.

To summarize, in general, we find support for our hypothesis; that is, when we compared the neural responses in the interpersonal-mentalizing condition with those in the

Figure 3

STUDY 4: SIGNIFICANT CORRELATIONS BETWEEN SToM SCORES AND NEURAL ACTIVITY FOR THE INTERPERSONAL-MENTALIZING-VERSUS-PROCESS CONDITION



Notes: Twenty salespeople completed the SToM scale, which measured their ability to infer mental states, such as beliefs, intentions, and desires from customers, and participated in an experiment that monitored their brain activity with fMRI during a mentalizing task. Correlation analysis revealed three clusters of regions associated with theory of mind that were significantly correlated with SToM scores. Salespeople scoring high on the SToM measure displayed greater activations in the right MPFC and the right and left TPJ. The picture is an overlay of the statistical parametric map, on a template brain, resulting from the correlation of the SToM scores and neural activity for the contrast of interpersonal-mentalizing-versus-process condition.

process and unlinked-sentences conditions, the MPFC and right TPJ regions were differentially activated in the high- and the low-IM groups. In addition to the MPFC and right TPJ, a correlational analysis revealed that the left TPJ was also significantly correlated with SToM measures. However, this effect was weaker in the TP region for the contrast of interpersonal mentalizing versus process, and the TP was equally activated in high- and low-IM groups for the contrast of interpersonal mentalizing versus unlinked sentences.

Finally, the tests for the interpersonal-mentalizing-versus-process contrast and interpersonal-mentalizing-versus-unlinked-sentences contrast yielded somewhat different results. This is likely to be due mainly to the noisy nature of the experiment and the different cognitive tasks involved in the process task and unlinked-sentences task.

DISCUSSION

In this study, we present a new theory-based SToM scale inspired from recent ideas on neuroscientific research on autism. We used both psychometric methods and fMRI-based research to validate the scale. Our research responds to Sujan's (1999) call for improved measures of salespeople's ability to "read" their customers. Such scales should tap into salespeople's ability to identify their clients' needs or desires at the underlying, rather than superficial, motive level. A core conclusion from neuroscience is that the brain consists of modules that are activated by different cues in the environment and, depending on individual differences, become activated in different intensities. Because salespeople both evoke and process these cues during sales encounters, such activations are coordinated in the brain to form a coherent interpretation ("sensemaking") of what occurs during a sales conversation (for an overview, see Camerer, Loewenstein, and Prelec 2005). Therefore, we developed a brain model that explains salespeople's ability to engage in interpersonal mentalizing.

The research consisted of four studies. In Study 1, we developed a paper-and-pencil measure (the SToM scale) to assess verbal expressions of the degree of interpersonal mentalizing that salespeople exhibit. The results showed that salespeople exhibit different degrees of interpersonal mentalizing that can be represented in four distinct but related dimensions, and furthermore the measures of SToM achieve convergent, discriminant, and criterion-related validity. Moreover, high versus low scorers on the SToM scale are relatively more adaptive in selling situations, are better able to take the perspective of customers, and show less fear of being evaluated negatively in selling situations. Study 2 replicated the findings of Study 1 and showed that the four dimensions of SToM are significantly related to performance. The performance measures were then validated on a new sample of high and low performers. Study 3 examined the construct validity of measures of SToM using the multitrait–multimethod matrix and CFA and also tested nomological validity. The measures showed high trait variance, low error variance, and very low method variance. Performance was driven largely by SToM: Rapport building influenced performance indirectly through social anxiety, and the other three dimensions of SToM influenced performance directly. We conducted Study 4 to discover whether different functioning of brain regions provides evidence for individual differences in the ability to mentalize interpersonally and to provide evidence that the four dimensions of SToM discriminate between high- and low-IM people. We hypothesized that the high-IM group would display relatively greater activations of specific regions of the brain (i.e., MPFC, TPJ, and TP) that have been consistently reported in the literature to be associated with mentalizing tasks. This hypothesis was largely confirmed: The high-IM group showed more activity than the low-IM group during the mentalizing task in the MPFC and TPJ regions of the brain, but this effect was much weaker in the TP regions and was nonexistent when we compared the interpersonal-mentalizing task with the unlinked-sentences task.

A closer inspection of the data shows that the TP regions were indeed activated highly in both the high- and low-IM groups (for evidence, see Web Appendix E at http://www.marketingpower.com/jmroct09). To the extent that such activation is related to the formation and use of mental scripts (e.g., Frith and Frith 2003), we speculate that both high- and low-IM salespeople equally use script-based thinking but differ in the ways described previously. Thus, it appears that only for high-IM salespeople is the entire network consisting of the MPFC, TPJ, and TP fully activated, whereas for low-IM salespeople, only part of the network, the TP, is activated. This interpretation is consistent with our previous conjectures that low-IM people rely too heavily on script-based (categorical) thinking, whereas high-IM people integrate such thinking with the use of ostensive cues and interpersonal sensitivity (see Table 1). However, it is also possible that the high-IM group paid more attention to the task, but this could also imply that they are more intrigued by the content of the interpersonal stories, as manifest in more thoroughly activated brain processing.

As Camerer, Loewenstein, and Prelec (2005) note, the more researchers know about functional specialization in the brain and how these regions collaborate in performing different tasks, the more these come to substitute for time-honored distinctions between categories used to study human behavior; such implications are likely to occur as well for how sales forces are studied in the future. In our research, the findings suggest that the capability to interpersonally mentalize reflects the ability to grasp subtle cues intuitively and effortlessly and to go beyond information given in an interaction to take a holistic point of view (a bird's-eye view). This latter ability involves generating coherent but conjectural stories about an interaction, which are revised as the conversation continues. Another important implication is that people differ in their utilization of their mentalizing networks, and these differences have several behavioral correlates. A possible explanation of the differences in the pattern of brain activity between the high- and the low-IM groups could be that this reflects a difference in cognitive strategy in computing information about mental states of others. The high-IM group displayed an activity pattern in which the MPFC and TPJ play a major role during interpersonal mentalizing, and this might reflect salespeople's abilities to be more dynamic, flexible, and adaptive interaction partners. The pattern of brain activity during interpersonal mentalizing suggests that the

MPFC and TPJ regions are significantly less activated in low- than in high-IM salespeople. Because only the TP is fully activated for low-IM people, whereas the MPFC, TPJ, and TP are activated for high-IM people, it appears that the pattern of responses for the low-IM people is consistent with the winner-takes-all metaphor we discussed previously. Here, we suggest that low-IM people act primarily in rigid ways and/or according to previously learned scripts. Either the low-IM person fails to process social stimuli fully in interpersonal interactions (because the MPFC and TPJ are less active) or the TP dominates the person's responses in the sense of overwhelming whatever activity exists in the MPFC and TPJ. The latter is consistent with a winner-takes-all perspective.

Interpersonal mentalizing also seems to be related to research on mindfulness in the organization science literature. However, to date, researchers in this tradition have limited their inquiry to the analysis of verbal reports by qualitative methods (e.g., Weick and Sutcliffe 2006). Whereas the information-processing perspective emphasizes a two-step process consisting of the categorization of customers followed by implementation of canned policies contingent on the categorization, mindfulness research has focused on disciplined observation of communication in a holistic sense and interpretation (sensemaking) of communication in light of the situation–person interface. Weick and Putnam (2006, p. 283) perceptively point out the limitations of the contingency approach as follows: "'When people engage in distinction-making, they begin to realize just how quickly we put our experiences into tidy and unexamined conceptual boxes' (Kabat-Zinn 2002, p. 69), how reluctantly we are to examine those conceptual boxes, and how much is discovered when we examine these boxes." Low-IM people seem to be especially prone to categorical thinking in the rigid way that Weick and colleagues characterize it, and at the same time, low-IM people appear to be relatively insensitive to ostensive cues and nuances in everyday human interaction. In contrast, high-IM people actively engage in ongoing sensemaking as an interaction ebbs and flows. This occurs apparently in their interpersonal-mentalizing brain network, which becomes highly activated. Sensemaking is manifest in a dynamic, back-and-forth interpretation between (1) the content of what is said and what is not said, including nonverbal communication and inference making of the desires and intentions of the interaction partner, and (2) a decoupled bird's-eye view of how the ongoing interaction is related to motivations and expectations of the institutions and people connected to the interaction. Needless to say, high-IM people have an advantage that low-IM people lack. Our study suggests that the difference occurs in specific brain regions that vary across high- and low-IM people, and a paper-and-pencil scale can capture aspects of interpersonal mentalizing in this sense.

Can interactive mindfulness be learned? This is a difficult question to answer at this stage of what is known about mentalizing and what is required to cultivate mindfulness. However, we believe that through observational learning, role-playing, and practice, salespeople can be trained to become better in the practice of mindfulness and perhaps even enhance their mentalizing abilities to a certain extent. The first step in such training is to make people aware that the anxiety they experience during sales conversations may be a consequence of undeveloped skills in interpersonal mentalizing (see Ramachandran and Oberman 2006) and that anxiety can be reduced to the extent that they develop the discipline to occasionally assume a posture of a detached, abstract observer of their own interactions as they occur, which provides the opportunity to interpret the flow of ostensive cues at multiple, specific occasions across an ongoing interaction. For example, this might involve the subvocal posing of questions at different points in time (e.g., "Did the customer's hint to the effect that she wished we could bundle our offerings mean that her company would order more in the long run to achieve this short term benefit?") (Richardsen and Piper 1986).

Moreover, role-playing may stimulate interpersonal mindfulness. Brief simulated interactions could be videotaped, and a skilled, sensitive trainer could analyze the tapes with the salesperson, pointing out what to watch for in ostensive cues and how to respond effectively (e.g., Soldow and Thomas 1984). For example, a customer might show signs of discomfort that could be traced to a mechanical or overly assertive style by the salesperson. Such role-playing could take place, if appropriate, in the presence of other salespeople of the firm because salespeople will differ in their styles and abilities to mentalize, and shared learning could be facilitated. Considerable development and trial and error may be needed to institute effective role-playing exercises of this sort. Note also that the diagnosis, training, and coaching of mindfulness may be best conducted by people identified as particularly skilled in interpersonal mentalizing and practiced in mindfulness. To the extent that mindfulness can be trained, this will have neurological implications as well. In this regard, many researchers (e.g., Hariri and Forbes 2007) have proposed that through life experiences, circuits in the brain get wired and rewired, a process that is called "neuroplasticity." This speculation points to areas for further research.

STOM AND ADAPTS

How do the SToM and ADAPTS scales differ? The SToM scale is a multidimensional scale designed to measure specific implications of interpersonal mentalizing, whereas Spiro and Weitz (1990) treat ADAPTS as a unidimensional scale to measure a general, or overall, tendency to practice adaptive selling. Furthermore, SToM refers to largely automatic processes in which salespeople "read the minds" of customers and, in turn, cocreate the nature and course of the interaction with customers, whereas adaptive selling is a largely deliberative process in which salespeople identify customers and selling situations so as to respond according to coarse-grained a priori learned categories; thus, adaptive selling is more of a one-way pattern of communication, albeit informed by learning in an adaptive sense. The first dimension of SToM, rapport building, captures a quality of the relationship between salesperson and customer, whereas the three other SToM dimensions (detecting nonverbal cues, taking a bird's-eye view, and shaping the interaction) reflect particular practices or things salespeople do to influence the sales outcome. Although general adaptiveness as measured by ADAPTS might predict sales performance, the items do not identify the specific reasons for or mechanisms behind their effects. The

SToM scale measures things that might be considered the bases for general adaptiveness and thus constitute managerial policy variables for which salespeople can be selected, trained, and coached to improve adaptiveness (and influence perspective taking, coping with social anxiety, and performance). The tests of our hypotheses support the effects of the SToM dimensions on performance, both indirectly through social anxiety and directly. Indeed, not only might SToM be considered more psychologically fundamental and managerially useful than ADAPTS, but it also might supersede ADAPTS in its effects on performance, as our findings imply.

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