SCARF® in 2012: updating the social neuroscience of collaborating with others

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The SCARF® model stands for Status, Certainty, Autonomy, Relatedness and Fairness. SCARF defines the five domains of experience that activate strong threats and rewards in the brain, thus influencing a wide range of human behaviors. In the five years since its introduction in 2008, SCARF has become a widely discussed model in management circles, including being highlighted as one of the "Best Ideas of 15 Years" by *Strategy+Business* magazine.

Students in the NeuroLeadership Institute's post-graduate and masters program are conducting a wide range of research studies based on SCARF concepts, and hundreds of thousands of people have learned about the model through blogs, videos, and training programs. Since first being published, social neuroscience research has contributed to a more in-depth understanding of the domains of SCARF, providing support for the model and motivating further exploration of each domain.

In this article, we begin by proposing a conceptual model for how SCARF enables people to exhibit more adaptive behaviors, based on how mental experiences occur over time. We then update the research supporting the SCARF model that has been conducted in the five years since it was published, starting with the importance of social processing in the brain, and then highlighting recent social neuroscience findings relevant to each of the SCARF domains. Finally, we explore interactions between the domains, and issues such as individual variation and SCARF, the ideas of the multiplying and offsetting effects, as well as SCARF and leadership, culture, engagement and reward.

A conceptual model for the way SCARF can improve thinking and performance in individuals and teams

The SCARF model improves people's capacity to understand and ultimately modify their own and other people's behavior in social situations, to thus be more adaptive. The model is especially relevant for organizational leaders and managers, organizational learning and development professionals, facilitators, trainers, coaches, consultants and teachers, as well as socialworkers, community aid workers or anyone looking to influence others.

We collectively call these types of people 'change agents'. SCARF is also helpful for understanding and improving the quality of everyday interactions with colleagues, friends or family.

The SCARF model enables people to be more adaptive by providing a clear, easy-to-remember language.

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How does SCARF specifically help? The SCARF model enables people to be more adaptive by providing a clear, easy-to-remember language. Having this language improves our ability to label or reappraise our emotions, which helps to regulate social threats and rewards (Ochsner, 2008). Social threats in particular, such as a fear of looking bad in front of your peers, can inhibit high-quality perception, cognition, critical thinking, creativity and collaboration. Having a memorable language for social threats and rewards allows us to notice these experiences at several points that we may not otherwise: before, during, or after an emotion-producing event.

Before: prediction

The language of SCARF can help us predict whether a threat is going to happen and modify our activities or choices accordingly. In James Gross's model of how emotions unfold, this is called 'situation modification' (Gross, 2003). This is being introduced in this paper as the PRE model by David Rock.

Before an emotional event occurs, SCARF enables people to predict ahead of time the impact that an action may have on others. For example, before announcing the reorganization of a team, a manager might recognize that the team could sense this as a status threat. He could then offset this threat by increasing people's sense of certainty about the situation by providing more information, and increasing their sense of autonomy by providing some choice in how the process occurs. Before a SCARF threat kicks in, knowing SCARF enables us to mitigate or take away the threats that an interaction might bring about.

The language of SCARF can help us notice a threat occurring while it is happening in real time and look to regulate our emotions.

During: regulation

The language of SCARF can help us notice a threat occurring while it is happening in real time and look to regulate our emotions. Many studies show that labeling or reappraising emotions can help reduce the emotion and increase executive functions (Lieberman, 2009).

During an arousal-producing event, SCARF provides people with an easy-to-recall framework to label and reappraise their response. Regulating emotions during the event is not easy, as strong emotions reduce the capacity for self-regulation (Ochsner, 2008). With an easy-to-recall framework like SCARF, people are able to identify the cause of a threat response better through labeling. They can also then change their response to an event through reappraising, which is easier to do after labeling has allowed them to reduce the overall threat response. Reappraisal can also occur by changing your opinion of other people's reactions to events. For example, in the situation where someone felt their work was attacked by others during a meeting, knowing SCARF could help an individual identify (label) their response as a status threat, and then look to see which threats others might be feeling that could be driving their reactions (for example uncertainty). In this way SCARF can help with the two main planks of self-regulation, both labeling and reappraisal. Doing this in the heat of the moment, where possible, can help people make better choices and reduce social conflict.

After: explanatory

After an emotional event, such as a team meeting that went wrong because a comment generated a sense of unfairness, SCARF can also help people explain and therefore understand a situation. This does not necessarily increase adaptive responses in the moment, but can reduce uncertainty and ongoing conflict over time. With this knowledge, people may choose different strategies in the future for interacting with others. Using SCARF to explain a situation after the event may be the easiest and most likely use of SCARF. However, with sufficient awareness, people may be able to move from using SCARF after to during and then before an event, from explanatory to regulatory to predictive, as the distinctions become more easily accessed from moment to moment. More research would be useful on this issue.

In summary, understanding SCARF can impact people in these ways:

Before an event: prediction

SCARF can provide an increased ability to minimize negative and maximize positive emotions ahead of time in oneself and others, thereby mitigating distracting threats and increasing overall motivation.

During an event: regulatory

SCARF can increase the ability to regulate one's own and others' emotions in the moment, thereby increasing perception, cognition, creativity and collaboration.

After: explanatory

SCARF can increase one's ability to understand strong emotions after the fact, thereby decreasing uncertainty, and enabling different choices in the future.

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In short, SCARF is a cognitive tool, a heuristic, for quickly and easily recalling the potential impact of your actions on others (and others' actions on you), thus enabling the possibility of different choices. The fact that it is simple to recall makes it especially useful as it can be easily accessed when cognitive resources are low.

The five domains of SCARF

We begin with a brief review of the five domains of the SCARF model (Rock, 2008). **Status** refers to one's sense of importance relative to others (e.g., peers, co-workers, friends, supervisors). **Certainty** refers to one's need for clarity and the ability to make accurate predictions about the future. **Autonomy** is tied to a sense of control over the events in one's life and the perception that one's behavior has an effect on the outcome of a situation (e.g., getting a promotion, finding a partner). **Relatedness** concerns one's sense of connection to and security with another person (e.g., whether someone is perceived as similar or dissimilar to oneself, a friend or a foe). Finally, **Fairness** refers to just and non-biased exchange between people (e.g., praise for or acknowledgment of one's efforts, equivalent pay for equivalent work, sharing a candy bar with everyone, etc).

All five of these domains can have an impact on a person's perception of a social situation, be it threatening or rewarding. For example, uncertainty about the way one's boss is evaluating one's performance can be threatening in the same way as uncertainty about whether the dark, elongated shape in one's peripheral field of view is a snake or not. Conversely, being acknowledged for one's hard work and effort by a supervisor can be rewarding in the same way as finding money on the street is rewarding.

The importance of social processing in the brain

Since 2008, advances in social neuroscience research have supported the basic tenets of the SCARF model: the view that social concerns are a primary motivator for human behavior, and that the human brain is primed to attend to and process social information in a privileged manner.

Specifically, research has shown that humans have a fundamental need to belong, are incredibly sensitive to their social context, and are strongly motivated to remain in good standing with their social group and avoid social exclusion (Heatherton, 2011). There is compelling evidence that the experiences people perceive as both the best and the worst in their lives are not individual achievements such as winning awards, but social experiences, such as beginning and ending close relationships (Jaremka, Gabriel & Carvallo, 2011). Understanding of others' minds and emotions is central to the way our brains process information.

Social pain is processed in the brain in much the same way as physical pain. Being excluded from a game or looking at a picture of someone who broke up with you 'hurts' and also engages very similar brain regions as when you are physically hurt (i.e., when something hot touches your arm) (Eisenberger, 2012). Similarly, social rejection or ostracism can lead to increased inflammation in the body (Slavich, Way, Eisenberger, & Taylor, 2010) and negative mental health consequences such as depression (Williams & Nida, 2011). Recent evidence has taken this even further, showing that people who took acetaminophen, a physical pain reliever, for three weeks reported reduced levels of social pain and showed reduced neural responses in the brain regions involved in the pain associated with social rejection compared with those who took a placebo (DeWall *et al.*, 2010). Just as the direct experience of social rejection activates pain circuits in the brain, so too does watching someone else being socially rejected (Masten, Eisenberger, Pfeifer & Dapretto, 2010).

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The processing of threat and reward in the brain is also affected by social context. Bault, Joffily, Rustichini, and Coricelli (2011) showed that beating a peer in a lottery is more rewarding than winning alone, that this is associated with greater activity in the brain regions that process reward and social information, and that social winning increases the likelihood that people will take more risks and be more competitive.

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These and other social neuroscience findings, further detailed in this article, make a strong argument that the consideration of the social and emotional responses and needs of others play a role in helping people successfully collaborate and understand one another. This is especially relevant for individuals in leadership roles, since fostering and supporting rewarding experiences, such as a sense of connectedness among employees, is crucial for well-being and job satisfaction. In fact, recent research cites co-worker incivility not only as a cause of increased distress and problems in the workplace, but also as leading to a carryover effect in which stress from work is transferred to the home, negatively impacting on personal relationships by, for example, reducing marital satisfaction (Ferguson, 2012).

The social abilities of team members are of the utmost importance in enhancing performance. "Collective intelligence", or how well a group of people performs across a wide range of tasks, does not depend on having one or many smart people in the group, but instead is directly related to factors such as the social sensitivity of the group members and how much time is spent giving everyone in the group equal time to talk (Woolley, Chabris, Pentland, Hashmi, & Malone, 2010).

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The wide reach and influence of SCARF has motivated an exploration of the most recent social neuroscience research, and how findings from the last five years can update and provide a more in-depth understanding of the SCARF domains and their influence on human social behavior. The following sections highlight results from recent studies relevant to each of the five SCARF domains.

The latest social neuroscience of SCARF

Status

People are acutely sensitive to their social status, that is, their importance relative to others, and tend to be accurate judges of where they fall on the social ladder (Srivastava & Anderson, 2011). Even though people have a good sense of their own social status, comparing oneself to another person with higher status can elicit a threat response. Stronger envy when comparing oneself with someone of higher social status is associated with activation in the dorsal anterior cingulate cortex, a region of the brain implicated in processing pain (Takahashi *et al.*, 2009). Conversely, stronger Schadenfreude, or pleasure derived from another person's misfortune, is associated with activation in the striatum, which is involved in processing reward (Takahashi *et al.*, 2009).

Status-confirming information can elicit activation in reward neural circuitry.

Sensitivity to one's own social status can also be seen in small-group settings, where a perception of lower status in the group is associated with reduced cognitive capacity (lower IQ), increased responses in the amygdala, and decreased responses in the prefrontal cortex relative to perceived higher group status (Kishida, Yang, Quartz, Quartz, & Montague, 2012). Making social status salient can also influence large-scale brain activity. Priming high social power (think of a situation in which you had power over someone) versus low social power (think of a situation in which someone had power over you) was associated with increased left frontal brain activity, previously shown to be related to a tendency to an approach-related orientation and seeking of reward (Boksem, Smolders, & De Cremer, 2012).

Status-confirming information can elicit activation in reward neural circuitry. Izuma, Saito, and Sadato (2008) showed common activity in the striatum when a person received a monetary reward and when he or she acquired a social reward, namely, when perceiving that he or she was acquiring a good reputation with others. Izuma (2012) further argue that reputation-based decision-making drives many aspects of human social behavior and engages not only the striatum, but also the medial prefrontal cortex, temporal parietal junction, and amygdala, further highlighting the importance of status in threat, reward, and social processing.

Actively and consciously considering status-related information, such as when we compare ourselves to someone more affluent or with a more prestigious job, affects both our behavior and threat/reward neural activation.

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However, one's predisposition toward valuing status-related information operates on a more non-conscious level as well. Terburg, Hooiveld, Aarts, Kenemans, and Van Honk (2011) showed that people who tend to be more dominant took longer to avert their eyes from a subconsciously presented angry face. In the same study, people who were less dominant and more sensitive to reward took longer to look away from happy faces, also presented without conscious awareness. These findings support the idea that the importance of status for an individual may be a basic personality trait and can influence social interactions even if he or she is not aware of it. Someone who highly values status may be more likely to react to status-threatening situations in an aggressive and confrontational manner.

The tendency to perceive changes in social status as threatening also appears to be related to a person's baseline levels of testosterone. After losing a competitive task, both men and women with higher levels of testosterone exhibited increases in cortisol, a stress hormone released during a threat response, compared with low-testosterone losers (Mehta, Jones, & Josephs, 2008). More recent work highlights the critical interplay between hormones and stress in dominance and social status. People who are high in testosterone but low in cortisol (low stress) seek to gain more social dominance, whereas high testosterone paired with high cortisol (high stress) is actually associated with seeking lower status (Mehta & Josephs, 2010).

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Together, these studies support and extend prior work, showing that threats to or confirmation of status influence the way in which people perceive others and interact in social settings.

Certainty

Imagine how you would feel if your flight had been delayed and you were sitting in the plane on the runway. Would you feel less anxious and annoyed if the pilot gave you constant updates, or would you be just as happy if you did not have any of that information? People differ in their need for certainty and their ability to tolerate uncertain or ambiguous situations. Specifically, intolerance of ambiguity is the tendency for one to perceive ambiguous or uncertain situations as sources of threat.

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In general, increasing certainty is perceived as rewarding and increases activation in reward neural circuitry (e.g., ventral striatum). Although previous research has shown that unexpected rewards increase activation in reward-related brain regions more than expected rewards, just receiving information about an upcoming reward also activates these reward regions. Dopamine neurons in monkeys have been shown to fire during the expectation of a reward, but also in the expectation of information about that reward (Bromberg-Martin & Hikosaka, 2009). Conversely, increased ambiguity or uncertainty decreases activation in reward circuits and increase activation in threat neural circuitry (e.g, the amygdala).

Individual differences in various personality traits can also affect the way that people process and respond to uncertain or ambiguous situations. Ambiguous social situations can cause a large amount of stress, especially if someone is worried about being negatively evaluated, and this anxiety and stress is amplified by low self-esteem. People with low self-esteem who experience ambiguous social rejection engage in more negative self-appraisal and self-blame, and also show greater cortisol reactivity than people with high self-esteem (Ford & Collins, 2010).

These studies highlight the rewarding nature of certainty and the threatening nature of uncertainty and ambiguity. An individual's ability to tolerate ambiguity has profound implications for whether or not uncertain social situations, such as the restructuring of a company or having to work with a new team of people, will be met with manageable or overwhelming levels of anxiety and stress.

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Autonomy

The perception of having autonomy, that is, of having control over the things that happen in one's life, has long been known to increase well-being and cognitive functioning, and to improve health. Across the globe, psychological prosperity (such as a sense of autonomy), as opposed to economic prosperity, better predicts feelings of well-being (Diener, Ng, Harter, & Arora, 2010).

People have a fundamental need for personal control.

People have a fundamental need for personal control. In a recent study by Leotti and Delgado (2011), people reported that they liked a cue that signaled being able to make a choice in the future more than a cue that predicted no choice. In the same study, anticipation of making a choice increased activity in the reward regions, specifically the ventral striatum, supporting the idea that a sense of autonomy is inherently rewarding.

Autonomy can be closely linked to the concept of agency, which is typically defined in neuroscience research as behavior that is self-generated (i.e., oneself moving a joystick vs. another person moving a joystick). Thus, the focus of much of this research is on who initiates a behavior and not why a person does so. However, Lee and Reeve (2012) were interested in the latter question, which is pertinent to a discussion of the social neuroscience of autonomy: What are the neural correlates of being motivated to do something because you are intrinsically motivated and choose to do it (autonomy), compared with being motivated by extrinsic factors such as incentives? Intrinsically, as opposed to extrinsically, motivated behaviors activated the anterior insula, which is implicated in integrating information about internal bodily states and emotional evaluations. This insula activation was found to be highly correlated with the level of perceived autonomy and satisfaction that people reported experiencing in their lives. Extrinsic motivations, such as performance-based monetary incentives, have actually been shown to reduce intrinsic motivation to perform a task, a phenomenon termed the "undermining effect", which is associated with reduced activation in the striatum and prefrontal cortex (Murayama, Matsumoto, Izuma, & Matsumato, 2010).

Inesi, Botti, Dubois, Rucker, and Galinsky (2011) showed that when people lack a sense of power (i.e., control over what other people do), they seek out a sense of choice (i.e., control over their own outcomes), and vice versa. People can be content with only a sense of power, only a sense of control, or both, but having neither power nor control leads to dissatisfaction.

These findings have specific implications for the workplace; leaders should be able to increase the satisfaction of individuals with a relatively powerless or low-level job by giving them a greater perception of choice, thereby increasing autonomy. In fact, Wood and De Menezes (2011) showed that this was the case; employees with a greater sense of autonomy reported greater job satisfaction and reduced anxiety. Social neuroscience research highlights the cognitive and neural mechanisms underlying this phenomenon – since the perception of autonomy is processed in the brain as a reward, and that fostering intrinsic motivation is also rewarding, implementing leadership practices that increase autonomy and intrinsic motivation in employees will increase productivity and promote collaboration.

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Relatedness

The degree to which people feel a sense of connectedness and similarity to those around them is directly related to whether or not people feel they are engaging in safe or threatening social interactions. The phenomena known as "in-group preference" and "out-group bias" refer to the consistent finding that people feel greater trust and empathy toward people who are similar to themselves and are part of their same social circles, and greater distrust and reduced empathy toward those who are perceived as dissimilar and members of other social groups.

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People even process information about in-group members and out-group members in different parts of the brain (Mitchell, 2009; Jenkins, Macrae, & Mitchell, 2008). In-group preference and out-group bias are not only human phenomena, but are observed in monkeys as well (Mahajan *et al.*, 2011).

...people feel greater trust and empathy toward people who are similar to themselves...

It appears that the definition of in-group and out-group members is not limited to racial, ethnic, or political distinctions, but that arbitrarily assigning people to different teams can have the same effects of increasing liking for members of one's own team and decreasing liking for members of the other team, which is reflected in brain activity (Van Bavel, Packer, & Cunningham, 2008). Mitigating in-group bias and out-group prejudice is an important consideration when facilitating collaboration among individuals who may perceive outside individuals as a threat (e.g., an independent consultant, a new team of coworkers, etc.) Walton, Cohen, Cwir, and Spencer (2012) showed that providing minimal social links to another person or group increases motivation and performance. Equally important is the fact that increasing intergroup contact can reduce the prejudice observed toward out-group members (Dhont, Roets, & Van Hiel, 2011). If two groups or teams of people need to work together, fostering more social contact between groups is one way to increase relatedness and decrease a sense of threat.

Oxytocin, a neuropeptide involved in social cognition and behavior in mammals, is involved in increasing relatedness. It has been shown to reduce social stress, reduce amygdala activation, improve the processing of social and emotional information, and increase attachment and empathy toward others (Meyer-Lindenberg, Domes, Kirsch, & Heinrichs, 2011). New research, however, has questioned this "love drug" role of oxytocin; instead, it may play a more general role by increasing all approach-related social behavior (e.g., positive as well as negative emotions such as anger and jealousy) and reducing social withdrawal (Kemp & Guastella, 2011). Interestingly, oxytocin not only promotes in-group trust and cooperation, but also increases aggression toward out-groups (De Dreu *et al.*, 2010).

Several research studies have shown that the size of one's social network is related to the structure and function of the brain. In monkeys, living in larger social groups is associated with increased gray matter volume and increased functional coupling between brain regions important for processing social information (i.e., temporal and prefrontal cortices) (Sallet *et al.*, 2011). Pertinent to the ever-increasing prominence of social media and the debate about its effects on social relationships and relatedness, Kanai, Bahrami, Roylance, and Rees (2012) showed that the more friends people have on Facebook, the greater the size of their amygdala and temporal cortex. Tamir and Mitchell (2012) recently reported that people are highly motivated to share information about themselves, and that self-disclosure is related to increased activation in reward regions of the brain. It is interesting to speculate whether this motivation for self-disclosure is an underlying factor in the popularity of social networking sites like Facebook, and whether greater self-disclosure is related to larger social networks and an increased perception of social support.

Relatedness isn't just about feeling good. New studies show that having stronger social relationships increases your chance of living longer. A meta-analysis across 148 studies concluded that people with stronger social relationships have a 50% increased likelihood of survival than those with weaker social relationships (Holt-Lunstad, Smith, & Layton, 2010). Similarly, people who feel they have high levels of social support at work are at a reduced risk of mortality (Shirom, Toker, Alkaly, Jacobson, & Balicer, 2011).

Relatedness isn't just about feeling good...having stronger social relationships increases your chance of living longer.

Fairness

The perception of the fairness of any situation is not based on "cold", rational thought processes, but instead, emotions are integral to judging fairness, and those judgments emerge over time through social experiences with others (Barsky, Kaplan & Beal, 2011).

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Unfair offers in neuroeconomic games, in which one person has to divide money between himself and another player and does so in an unequal manner (e.g., $9/$1), elicit strong negative emotional reactions and increase anterior insula activation (Rilling & Sanfey, 2011). Recent research has also shown that the amygdala is activated during the rejection of these unfair offers (Gospic *et al.*, 2011). Even when fair and unfair offers are made equally valuable (i.e., equating their monetary value), people are happier to receive fair offers than unfair ones, and receiving fair compared to unfair offers activates reward regions in the brain (Tabibnia, Satpute, & Lieberman, 2008).

Even when fair and unfair offers are made equally valuable…people are happier to receive fair offers than unfair ones…

Not only receiving, but also making fair offers activates reward- and theory of mind-related brain regions (Weiland, Hewig, Hecht, Mussel, & Miltner, 2012). Tricomi, Rangel, Camerer, and O'Doherty (2010) reported that people who gave more money to others than to themselves, i.e., acted pro-socially and reduced inequality, showed increased activity in the ventral striatum and ventromedial prefrontal cortex, reward-sensitive brain regions. The authors claim that this is evidence for inequality-averse social preferences in the brain.

Results from a meta-analysis showed that perceptions of unfairness in the workplace can negatively affect employees' physical and mental health (Robbins, Ford, & Tetrick, 2012). Accordingly, increasing the perception of fairness and reducing unfairness will promote satisfaction and well-being, especially in social situations in which sensitivity to interpersonal equality and inequality is heightened.

Interactions between SCARF domains

Although much can be said about each SCARF domain on its own, recent social neuroscience research points to several ways in which these domains relate to one another. Two of the most prominent are the connections between Status and Relatedness, and between Certainty and Relatedness.

Status and Relatedness

Social status can influence the way we relate to, behave toward, and interact with others. Lount and Pettit (2012) showed that people with high status were more trusting of others than are people with lower status, and this is due to the fact that high-status individuals believe that others have positive (benevolent) intentions toward them. One's own social status can influence activity in reward-related brain regions when processing information about the social status of others. People with lower social ranking (i.e., lower socioeconomic status) showed increased activation of the ventral striatum when answering questions about a low-status individual, and people with higher social ranking showed increased activation in the same brain region when answering questions about a high-status individual (Ly, Haynes, Barter, Weinberger, & Zink, 2011). In a highly publicized paper, Piff, Stancato, Cote, Mendoza-Denton, and Keltner (2012) showed that upper-class (high social status) individuals are more likely to act unethically than lower-class individuals. These behaviors included cutting people off while driving, cheating, stealing office supplies, taking candy that was intended for children, and viewing greed more positively, Further research suggests that higher social class people are worse than lower social class people at reading others' emotions, that is, they are lower in empathy (Kraus, Horberg, Goetz, & Keltner, 2011).

Individuals who experience high levels of anxiety in social situations (social anxiety disorder), perceive themselves as having low social rank, but also having low perceived closeness with others, including peers, friends, and romantic partners (Weisman, Aderka, Marom, Hermesh, & Gilboa-Schechtman, 2011). Difficulties relating to others are associated with perceptions of reduced social status.

…economic status can at times reduce relatedness…

We have discussed how perceptions of high status and greater relatedness are rewarding. Recent work takes this one step further and purports that a particular kind of status – sociometric status, that is, respect and admiration from peers – is much more predictive of a person's well-being than socioeconomic status (Anderson, Kraus, Galinsky, & Keltner, 2012). This highlights the integral relationship between Status and Relatedness; increased social status that grows from better relatedness to others appears to be more rewarding than economic status.

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We suspect that economic status can at times reduce relatedness (think of wealthy people in homes with big walls, cut off from people), whereas sociometric status involves being in a community of others.

Certainty and Relatedness

Relating to and understanding others usually involves some degree of uncertainty or ambiguity because we have to guess or deduce what other people are thinking or feeling. Activity in the medial prefrontal cortex is sensitive to the amount of ambiguity involved when making decisions about what a person thinks or feels, reflecting greater computational demands in the part of the brain implicated in simulating different possible scenarios (Jenkins & Mitchell, 2010).

In addition, personality characteristics such as a need for cognitive closure (i.e., a high need for certainty and to avoid ambiguity) are related to prejudice. People who have very low tolerance for ambiguity exhibit higher levels of race- and gender-based prejudice (Roets & Van Hiel, 2011). Promisingly, however, increasing contact between in-groups and out-groups is effective in reducing prejudice, especially in people who have a high need for cognitive closure. Uncertainty can undermine relatedness (increase prejudice), but increasing one type of relatedness (intergroup contact) can mitigate the threat caused by uncertainty and reduce its negative impact on relatedness (reduce prejudice).

Individual variation and SCARF

The SCARF model provides an intuitive and easily remembered framework for conceptualizing the main factors that influence the way people perceive and respond to social situations. The five factors of the model – Status, Certainty, Autonomy, Relatedness, and Fairness – all affect the extent to which a person feels threatened or rewarded in social settings, and therefore the extent to which a person is able to collaborate effectively with others. Going beyond these general descriptions, the SCARF framework has also been used to characterize individuals in terms of their sensitivity to each of the five domains, effectively creating custom SCARF profiles. This individual differences approach highlights the ways in which people with different SCARF styles require different approaches when managing or collaborating with others. For example, a person who is highly anxious in uncertain situations will likely need more clarity and concrete detail than a person who is more tolerant of uncertainty.

In informal studies within SCARF workshop settings run by the NeuroLeadership Group (a consulting firm that draws on the NeuroLeadership Institute's work), people appear to have widely different orders in which the domains of SCARF are important to them. For example, an individual may feel most passionately about fairness, and least passionately about status, with the other domains spread in between. This individual variation is likely to be influenced by the environment at the time, and perhaps change over one's lifetime; however, it also appears to be relatively static. An individual who valued fairness can usually track back through their life history and see how this domain informed their life and career choices over time. This is an area for substantial future research, with individual variation studied over time in relation to different career paths and in connection with genetic variability.

Table 1

	S	C	A	R	F
Total (out of 6239)	791 (12%)	2898 (46%)	190 (3%)	1684 (27%)	766 (12%)
Gender: M, F	313 (40%), 478 (60%)	1077 (37%), 1821 (63%)	77 (41%), 113 (59%)	671 (40%), 1013 (60%)	325 (42%), 441 (58%)
Age (under 18)	67 (8%)	188 (6%)	24 (13%)	175 (10%)	120 (16%)
Age (18–25)	47 (6%)	168 (6%)	8 (4%)	124 (7%)	63 (8%)
Age (26–35)	244 (31%)	601 (21%)	48 (25%)	395 (23%)	216 (28%)
Age (36–45)	234 (30%)	842 (29%)	47 (25%)	448 (27%)	180 (23%)
Age (46–55)	146 (18%)	766 (26%)	44 (23%)	390 (24%)	135 (18%)
Age (56–65)	47 (6%)	305 (11%)	17 (9%)	136 (8%)	47 (6%)
Age (over 65)	6 (1%)	28 (1%)	2 (1%)	16 (1%)	5 (1%)
Top Industry	Banking/ Finance 80 (10%)	HR 326 (11%)	HR 28 (15%)	Education 198 (12%)	Education 104 (14%)
2nd Industry	HR 80 (10%)	Education 291 (10%)	Accounting, Education, Engineering 17 (9%)	HR 176 (10%)	HR 66 (9%)

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In contrast to data from informal studies are findings from a large-scale research study conducted by the NeuroLeadership Group in which SCARF profiles from over 6,300 individuals were collected. Table 1 summarizes these findings, highlighting the most prevalent profile types and demographic variables associated with each. What is striking here is that 46% of responders indicated that the most important domain was Certainty, followed by Relatedness, which 27% of responders rated as the most important domain.

Without some kind of awareness of other people's motivators, managers and peers will tend to try to motivate in the way they themselves would be motivated.

Understanding individual variation can have many benefits. Identifying an individual's SCARF profile can help tailor both engagement as well as reward programs to each person by focusing on their key drivers rather than all domains at once. This kind of assessment can be helpful because of our tendency to think that others perceive the world as we do, a bias called the 'false consensus effect' (Ross, Greene & House, 1977; Krueger & Clement, 1994). Without some kind of awareness of other people's motivators, managers and peers will tend to try to motivate in the way they themselves would be motivated.

SCARF and culture

While there appears to be some individual variation in SCARF profiles, there is likely to also be a cultural influence in terms of ethnic culture, as well as the culture of someone's organization or community.

Studies from cultural neuroscience, summarized by Rockstuhl, Hong, Ng, Ang, and Chiu (2010), suggest that there is a genetic basis to a number of our tendencies that tie closely to SCARF. For example there is a gene that alters the uptake of oxytocin in the brain, which makes some cultures feel social rejection and social support more acutely. This genetic variation may be behind variations in collectivism versus individualism, pushing some cultures to value relatedness and fairness more, and others to value autonomy and status. Further research should be done on whether cultures have any consistent tendencies in terms of the SCARF framework itself, something that could help with intercultural understanding and communication.

Organizations are likely to have their own SCARF profile. An organization such as a start-up technology company, which values creativity and innovation, and requires an overall approach state, is likely to focus on issues such as autonomy, relatedness, and fairness, and try to reduce the status gap between people. However, the downside is that with so much autonomy and relatedness, certainty can suffer by having so much individual choice in how things are done and so many people involved in decision-making.

An organization that needs people to follow pre-existing systems may focus on using created status differentials to motivate others, as well as on the need for certainty with an emphasis on rigor and controls. An example of this might be a government office, where people may have high certainty but low autonomy. More research needs to be done on organizational SCARF profiles, the relevance of these, and how they can be altered over time.

...people experience the strongest sense of engagement when they have rewards occurring in multiple domains...

SCARF and workplace engagement

The paper entitled 'Neuroscience of engagement' (Rock & Tang, 2009) outlined how the SCARF domains are likely to be the underpinning drivers of workplace engagement. In this paper the authors showed how several of the more popular engagement assessments were measuring various domains of SCARF; however, with an uneven weighting and without

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all domains being measured. We propose that a more accurate measurement of engagement will be assessments that test evenly across all domains of SCARF. More research is needed in this area.

In noting that the SCARF domains drive threat and reward, it is useful to note that the reward or threat response can be either an expectation of or an actual positive increase in a domain. That is because expectations of rewards (or threats) are as strong as or stronger than actual rewards (Rock, 2009).

Minimizing disengagement is perhaps the first rule of thumb, as threat responses tend to be the most intense experiences.

Rock and Dixon propose that people experience the strongest sense of engagement when they have rewards occurring in multiple domains, termed the 'multiplier effect' (Rock, Dixon & Ochsner, 2010). For example, someone who is given a promotion may be rewarded by a greater sense of control over their work, an increased sense of status, and a perception of fairness if they worked hard to get the promotion. A feeling of making progress on a task, which was shown in a 2010 study (Amabile & Kramer, 2010) to be the most engaging experience at work, is likely to increase one's sense of status, certainty and autonomy all at once, another example of the multiplier effect.

The opposite is likely to be true as well: someone will be highly disengaged via the multiplier effect if their sense of uncertainty goes up as a result of a change in their team, over which they have less control than they expected, and it is seen as unfair. Minimizing disengagement is perhaps the first rule of thumb, as threat responses tend to be the most intense experiences. This best happens ahead of time through better planning of organizational initiatives to minimize SCARF threats, and by offsetting threats that may be necessary.

SCARF and change

The SCARF model partly explains why change can be so hard and points to ways of making change easier. Unless carefully managed, an organizational change is likely to affect all five domains of SCARF for a wide range of people. Managing a change carefully would involve using the offsetting effect (Rock, Dixon & Ochsner, 2010) to create a perception of increases in the domains where increases are easiest to execute. For example, a team that is reorganizing functions could offset SCARF threats by involving people in some aspect of choice about the process, which would increase a sense of autonomy. Also information could be provided about the wider context so that people sense increases in certainty.

SCARF and leadership

There are many links between SCARF and leadership. In this brief summary we have explored a few of the links between SCARF and individual variation, culture, engagement, and change. Another issue involves self-management as a leader, or how a leader manages his or her own behavior.

The relationship between people and their boss is a troubled one on average. One study showed that people trust a stranger in the street more than their boss (Segalla, 2009). This challenge may be explained by SCARF and the multiplier effect. Having a boss creates a status threat through being the lower-status person. A boss tends to create uncertainty by not setting clear expectations and by continuously seeking improvements, which are seen as changes and therefore uncertain. A boss has the control and the final say, reducing one's autonomy. Bosses tend to keep themselves separate, putting themselves in a different group, in this case the out-group, resulting in a threat to relatedness. Finally, a boss is likely to be seen as unfair simply because they appear to be paid more money than their team while not doing the direct work. With all five domains under threat, there may be minimal sharing of information, reduced accurate perception of the other's thoughts and intentions, and reduced creativity.

The threat that leaders inherently create needs to be offset for successful collaboration. Successful leaders do this by increasing relatedness, which can come from identifying and focusing on shared goals, and also by being authentic and open so that people share positive human experiences (George, 2003). Alternatively, a leader may increase a sense of certainty through extensive sharing of information, or being sure to be clear about where people have authority and thus autonomy. Leadership may easily devolve into threat-producing experiences; however, with attention, leaders can learn to offset these threats and develop a relationship with their teams built on moderate rather than high stress.

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Conclusions

Economic theory that purports that individuals are purely rational decision makers is clearly false; people are also significantly driven by social information and social motivations, in the form of both threats and rewards. Leaders who acknowledge this and take advantage of being able to reduce threat and foster reward in each of the SCARF domains are going to be much more successful than those who expect people to suppress their emotions and social needs. Suppression is after all a strategy that tends to make emotions worse and further reduce cognitive functioning (Ochsner, 2008).

Leaders are under social magnification; everyone is watching them...

Leaders are under social magnification; everyone is watching them, looking for meaning, and even taking on their emotions non-consciously. All social interactions for a leader are meaningful and must be done with care. This is why it is so important to take advantage of psychology and social neuroscience research and to be aware of implicit or unconscious influences on behavior, especially social signals and biases. Understanding and internalizing the SCARF model can help leaders become more socially sensitive and socially adaptive, helping them to use social rewards and threats in more deliberate, useful ways that are in line with an organization's objectives. Christine Williams, a leadership development practitioner at NASA once said "we can predict what will happen to a tiny space craft in 10 years and a million miles away, but we can't seem to predict what will happen at a meeting tomorrow." SCARF may be only one small step in the journey toward understanding social interactions, but it appears to be a step in the right direction.

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