THE OPPOSING DOMAINS OF LEADERSHIP: INTEGRATING TASK AND RELATIONSHIP

by

Kylie Rochford

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Department of Organizational Behavior
Weatherhead School of Management
Case Western Reserve University
Cleveland OH 44106-7235
e-mail: org-behavior@case.edu
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ABSTRACT

It is now generally accepted in the neuroscience literature that within our brain there are two distinct neural networks – the Task Positive Network which is concerned with analytical reasoning, and the Default Mode Network which is concerned with social and relational reasoning. Furthermore, a recent fMRI study shows that these two neural networks are anti-correlated, that is, when humans are engaged in an analytical task their ability to engage in a social or relational task is suppressed and vice versa. This phenomenon is referred to as the ‘opposing domains hypothesis’. In this paper we explore the implications of the opposing domains hypothesis for leadership and leadership effectiveness. We provide a review of the pertinent leadership literature to surface the task-relationship distinction in various conceptualizations and measurements of leadership. We then explore possible strategies that might minimize the extent of suppression of the opposing domain, which we argue will increase a leader’s ability to switch between task demands and relationship demands, thereby increasing leadership effectiveness.
INTRODUCTION

Over the past two decades, relationship-oriented approaches to leadership have come to the forefront of leadership theory (Bryman, 1992; House & Aditya, 1997; Hunt, 1999), while task-oriented approaches have been relegated to a periphery role. The work of early scholars clearly argues that both task and relations-oriented leadership is necessary for effective leadership (see, for example, Blake & Mouton, 1964), however the exact nature of the relationship between task abilities and relationship abilities of leaders and the impact of this relationship for leadership effectiveness have received limited attention. Recent findings in cognitive neuroscience, namely the opposing domains hypothesis (Jack et al., 2013), provide evidence to suggest that analytical or task reasoning and social or relational reasoning are driven by two distinct anti-correlated neural networks – the Task Positive Network (TPN) and the Default-Mode Network (DMN). By ‘anti-correlated’ the authors mean that there is a natural antagonism between these two networks – that is, activation of one network results in the suppression of the other (Greicius et al., 2003, Fox et al., 2005, Fransson, 2005, Golland et al., 2007, Tian et al., 2007, Uddin et al., 2009). This has led neuroscientists to conclude that analytical reasoning and social reasoning are reflective of two distinct cognitive modes (Jack et al., in press).

If analytical reasoning and social reasoning are indeed two distinct anti-correlated cognitive modes, then one must ask how a leader is able to attend to task requirements while also attending to the leader follower relationship. In this paper we review the leadership literature with the
opposing domains hypothesis in mind. We consider the implications of the opposing domains hypothesis for leadership in general and surface the task-relationship distinction underlying many past and current leadership frameworks. We begin our discussion with a brief review of the opposing domains hypothesis which further explains the relationship between the TPN and the DMN. We then explore how the distinction and trade-off between the task and relationship domains is delineated throughout the leadership literature. Finally, we discuss possible strategies leaders might use to enhance their ability to switch between the two cognitive domains, which we believe will result in greater leadership effectiveness. The paper concludes with the presentation of a conceptual framework and a series of propositions for future research.

OPPOSING DOMAINS HYPOTHESIS

Distinguishing between Default Mode Network and the Task Positive Network

Default Mode Network

The brain has three different neural systems that are each involved with a different type of social reasoning (Jack, in press). These systems are highlighted in Figure 1 by the yellow/orange areas. The first system is comprised of the fusiform face area on the ventral surface, the extra-striate body area on the lateral surface, and regions centered on the posterior portion of the superior temporal sulcus. This network is involved with any task that involves reasoning about living as opposed to non-living stimuli (Wiggett, Pritchard, & Downing, 2009). The second system includes the inferior parietal sulcus and the frontal premotor cortices. This system is more commonly known as the ‘mirror neuron’ system and is involved with tasks that involve either executing actions or watching the actions of others regardless of social context. An example of the use of these two systems in the leadership literature is the phenomenon of emotional
contagion - “the tendency to automatically mimic and synchronize facial expressions, vocalizations, postures, and movements with those of another person and, consequently, to converge emotionally” (p. 153-154, as cited in Hatfield, Cacioppo, & Rapson, 1994, p.5). Emotional contagion has been used to explain the convergence of emotion from leader to follower (Bono & Ilies, 2006; Johnson, 2008; see also Sy, Cote, & Saavedra, 2005), and from followers to leader (Dasborough, et al., 2009). While the first network should be activated by virtue of the interaction between two human beings, the second system would be activated as we mimic the observable behaviors and consequently converge in our (leader and follower) emotional states.

Finally, and of most interest to this paper, the third system, known as the ‘mentalizing system’, consists of the dorsal MPFC, the medial parietal/posterior cingulate, and a right lateralized region near the junction of the temporal and parietal cortices (Jack, in press). This system is activated by tasks that involve the attribution of mental states regardless of whether the stimulus is animate (i.e. humans or animals) or inanimate (i.e. robots). Within the mentalizing system, there is another cluster of regions known as the Default Mode Network (DMN). The DMN is comprised of regions that include the medial prefrontal, areas in the medial/posterior cingulate, the lateral inferior parietal, and the superior temporal cortices. The Default Mode Network is activated when a task requires either attribution of the mental states of others or reflection on our own mental states or emotions (Jack, 2013) and is anti-correlated with the Task Positive Network which attends to mechanical or analytical reasoning. When considering the tasks involved with leadership, the DMN would be involved with any form of relationship building, interactions between leaders and followers, and the leader’s sense making about their own emotions and the emotions of others.
The Task Positive Network (TPN) is a cluster of brain areas activated by non-social tasks involving working memory, language, logical reasoning, mathematical reasoning, and causal/mechanical reasoning (Jack, in press; Van Overwalle, 2011). While the TPN overlaps some networks in the social regions of the brain (the mirror neuron system, see (Van Overwalle and Baetens, 2009), it is clearly distinct from the mentalizing network discussed above, both in its location in the brain (the blue/green areas in Figure 1) and in the types of tasks that activate it (Jack, in press). The Task Positive Network (TPN) includes the dorsal attention system and the frontoparietal control network (Vincent et al., 2008, as cited in Jack, in press). Jack (in press, p. 20) characterizes the TPN as being involved in “analytical-empirical-critical reasoning, such as mechanical reasoning”. This characterization is in sharp contrast to that of the mentalizing system, and more specifically the DMN, which is involved with social reasoning.

**Figure 1: Distinguishing between the Task Positive Network and the Default Mode Network.**

*Source: Jack et al., 2013.*
The only exception with regard to the social versus non-social reasoning distinction associated with the DMN and TPN is when social reasoning is intentional. Intentional actions are associated with the mirror neuron system (Iacoboni, et al., 2005), which as noted about, overlaps with DMN. There is also some evidence that intentional actions may be associated with the TPN even when these actions require social reasoning. However, if this is the case, then it is hypothesized that the ‘intention’ component of the action involves thinking critically/strategically/mechanically, which is consistent with the TPN, hence explains the activation of this network despite there being a social component. The importance of intentionality in actions and how this links to neural and hormonal functioning has been raised in the leadership literature. Specifically, in attempting to examine the convergent and discriminant validity of clusters included in the Emotional Competence Inventory, Boyatzis and Sala (2004) found that there were two clear factors present – one factor reflected an intentional reasoning about the emotions of others in order to achieve a task, which is later labeled ‘emotional intelligence’ (Boyatzis & Goleman, 2007); while the second factor reflected social reasoning that was non-task focused, which is later labeled ‘social intelligence’ (Boyatzis & Goleman, 2007). Boyatzis and Sala predicted and later found evidence that social intelligence is linked to the parasympathetic nervous system (Boyatzis, et. al., 2012), while emotional intelligence is linked to the sympathetic nervous system. Given our current understanding of the TPN, leadership tasks associated with this network might include financial planning, anything requiring metrics, forecasting, and in light of the previous point, strategic networking and reasoning about the emotions with others primarily for the purposes of task achievement.
The opposing domains hypothesis

As discussed above, it is generally accepted in the cognitive neuroscience domain that the Default Mode Network (DMN) and the Task Positive Network (TPN), are anti-correlated (Greicius et al. 2003, Fransson, 2005, Fox et al 2005, Golland et al. 2007, Tian et al. 2007) – that is, as activity in one network increases, activity in the opposing network decreases (see Figure 2). A number of explanations for this relationship have been entertained (see Buckner, Andrews-Hanna, & Schacter, 2008 for a review), the most recent being the opposing domains hypothesis (Jack et al., 2013). The opposing domains hypothesis postulates that the anti-correlation between the DMN and the TPN is a result of the type of task a person is engaged in. Specifically, the opposing domains hypothesis states that holding the required level of attention constant, social tasks requiring the reasoning about the minds of others will activate the DMN, and therefore suppress the TPN and non-social tasks requiring reasoning about physical objects will activate the TPN and consequently suppress the DMN. In other words, when a person is engaged in a social task, their non-social or analytical abilities are suppressed. Conversely, when a person is engaged in a non-social task or analytical task, their social abilities and awareness are suppressed.

Figure 2: Anti-correlation of TPN and DMN
Source: Fox et al., 2005, 9673-9618
Jack et al. (2013) used functional Magnetic Resonance Imaging (fMRI) to record brain activity when participants were engaged in social versus mechanical tasks. The social tasks required participants to answer questions pertaining to the beliefs and attitudes of the characters in either an emotional and moral laden text passage or video clip. The mechanical tasks required participants to complete science puzzles or view and answer questions on video clips taken from the Video Encyclopedia of Physics. A rest condition was also included in which participants stared at a red cross on the ceiling. The findings showed that the neural activation during the social tasks, specifically the activation of the temporoparietal junction, medial parietal/posterior cingulate and the medial prefrontal cortex, was accompanied by the deactivation of the neural networks responsible for mechanical reasoning, specifically, the superior frontal sulcus, lateral prefrontal cortex, and the anterior intraparietal sulcus (see Figure 3 and Figures 4-9 in Table 1). To increase the robustness of this finding and to rule out alternative explanations, controls were put in place for external versus internal attention and perceptual attention demands.

Figure 3: fMRI images showing activation of TPN (Areas A, B, and C) and DMN (Areas D, E, and F). A: Superior frontal sulcus; B: Lateral prefrontal cortex; C: Anterior intraparietal sulcus (Task Positive Network) D: Temporoparietal junction; E: Medial parietal/posterior cingulate; F: Medial pre-frontal cortex (Default Mode Network)
Jack et al. (2013) conclude that the anti-correlation between the TPN and DMN “reflects a powerful human tendency to differentiate between conscious persons and inanimate objects in both our attitudes and modes of interaction” (p.396). The implications of this statement for organizational behavior are wide and varied. While this paper focuses on leadership and related variables, the natural tension between task and relationship; inanimate and animate; and social and non-social can be found in various streams of literature including, but not limited to personality frameworks, human needs, group dynamics and socialization, types of conflict, trust, intelligence, decision making, mindfulness, and moral reasoning.

THE OPPOSING DOMAINS OF LEADERSHIP

Conceptualizations of leadership

Nearly three decades ago Stodgill (1974) famously concluded that “there are almost as many definitions of leadership as there are persons who have attempted to define the concept” (p.259). In synthesizing the plethora of definitions on offer, there appears to be two distinct components of the enactment of “leadership”: task achievement and relationship development. Further, of the multitude of psychological and behavioural leadership competency models on offer, the individual competencies in these models can also be classified as relating to either instrumental task achievement or relationship development. Intertwined in the distinction between leadership as task achievement versus relationship development are patterns in how power is distributed and how decisions are made (Bass & Bass, 2008). In what follows, we first provide a brief historical overview of the emergence of the task and relationship dimensions in the leadership literature beginning with the early task-oriented conceptualizations of leadership and moving to consider
### Table 1: Changes in neural activation in the TPN and DMN by task type

<table>
<thead>
<tr>
<th></th>
<th>Analytical/mechanical Task</th>
<th>Empathetic/social task</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Superior Frontal Sulcus</strong> (-29 +1 +54)</td>
<td><img src="image1.png" alt="Graph" /></td>
<td><img src="image2.png" alt="Graph" /></td>
</tr>
<tr>
<td><strong>Temporoparietal Junction</strong> (+54 -60 +38)</td>
<td><img src="image3.png" alt="Graph" /></td>
<td><img src="image4.png" alt="Graph" /></td>
</tr>
<tr>
<td><strong>Lateral Prefrontal Cortex</strong> (-39 +31 +19)</td>
<td><img src="image5.png" alt="Graph" /></td>
<td><img src="image6.png" alt="Graph" /></td>
</tr>
<tr>
<td><strong>Medial Parietal/Posterior Cingulate</strong> (0 +45 +26)</td>
<td><img src="image7.png" alt="Graph" /></td>
<td><img src="image8.png" alt="Graph" /></td>
</tr>
<tr>
<td><strong>Anterior Intraparietal Sulcus</strong> (-39 -47 +41)</td>
<td><img src="image9.png" alt="Graph" /></td>
<td><img src="image10.png" alt="Graph" /></td>
</tr>
<tr>
<td><strong>Medial Prefrontal Cortex</strong> (-1 -55 +30)</td>
<td><img src="image11.png" alt="Graph" /></td>
<td><img src="image12.png" alt="Graph" /></td>
</tr>
</tbody>
</table>

**Figure 4:** Activation of the superior frontal sulcus - TPN (blue line) and deactivation of DMN (red line) when subjects were given an analytical task.

**Figure 7:** Activation of the temporoparietal junction – DMN (red line) and deactivation of TPN (blue line) when subjects were given a social task.

**Figure 5:** Activation of the lateral prefrontal cortex - TPN (blue line) and deactivation of DMN (red line) when subjects were given an analytical task.

**Figure 8:** Activation of the medial parietal/posterior cingulate – DMN (red line) and deactivation of TPN (blue line) when subjects were given a social task.

**Figure 6:** Activation of the anterior intraparietal sulcus - TPN (blue line) and deactivation of DMN (red line) when subjects were given an analytical task.

**Figure 9:** Activation of the medial prefrontal cortex – DMN (red line) and deactivation of TPN (blue line) when subjects were given a social task.
two of the more recent ‘new paradigm’ frameworks – transformational leadership versus transactional leadership and leader-member exchange versus leader-member social exchange.

From scientific management to human relations: the foundations the task-relationship distinction

The conceptualization of leadership as instrumental task achievement dates back to the work of Cowley (1928) who defined leadership as “an individual who is moving in a particular direction and who succeeds in inducing others to follow him…A leader then, is a person who is going somewhere, who has a motive, who has a program. A headman is an individual who has attained to the head of a group but who has no outstanding individual motive or program and who is, therefore, not a leader.” (p.145-146). In this passage, Cowley states that the key difference between a leader and a headman, who he claims is not a leader, is the presence of a ‘motive’ or ‘program’, which may also be thought of as a task. From this perspective, in the absence of a task, leaders do not exist and without the successful achievement of a task, a person cannot be an effective leader. Consistent with Cowley’s definition, and in line with much of the popular management theory in the early 1900s (largely influence by Fredrick Taylor’s scientific management movement), seminal work in the leadership field emphasised the task-components of leadership. Followers were considered to be instrumental machines in the leadership process rather than as active contributors to that process. However, as the human relations school of thought emerged in the late 1930s, the ‘human’ side of leadership began to receive more attention, resulting in a host of leadership frameworks that reflected the scientific management (task) – human relations (relationship) dichotomy. These frameworks include the autocratic (task)-democratic (relationship) continuum (Tannenbaum & Schmidt, 1958), the Ohio State
Leadership Studies (Shartle, 1950; Fleishman, 1953; Halpin & Winer, 1957) on initiating structure (task) and consideration (relationship), and the Michigan Leadership Studies (Katz, Maccoby, & Morse, 1950) which distinguished between a production orientation (task) and an employee orientation (relationship).

The 1950 to 1970s saw a significant shift away from task-driven approaches to leadership as theorists began to consider the role of interactions between leader and follower and leading to the re-conceptualization of leadership effectiveness as requiring both relationship building and task attainment. Influential in this shift was Bass (1960) who distinguished between successful leadership and effective leadership, power and coercion, and closely related, coercive leadership and permissive leadership. Bass (1960) distinguished between ‘successful’ leadership and ‘effective’ leadership as follows: “If A succeeds in changing B, and B attains his goal as a consequence, the successful leadership is effective. It B fails to gain his objective by following A’s leadership, the leadership is ineffective…Ineffective leadership occurs when members earn high scores as successful leaders but their groups are not effective” (p. 119, see also Hersey & Blanchard, 1969, p. 82-83). This passage clearly reflects the importance of both the relationship competencies of a leader, which are facilitated by the DMN, and the task competencies, which are facilitated by the TPN.

1950s – 1970s: Attempting to integrate task and relationship

By the 1960s it seems that there was a general consensus that building relationships with followers was a fundamental component of leadership and a critical ingredient in task
achievement. Theorists become interested in how we can integrate these two competencies and in which situations task-oriented leadership might be more effective than relationship-oriented leadership and vice versa. Bales (1958) was instrumental in this theoretical shift with his claim that a task oriented group requires two types of leaders to maximize effectiveness; one leader to attend to the task functions of the group (instrumental leader) and another to attend to the emotional needs of the group (expressive leader). Bales argued that while the type of leadership role one assumes may be influenced by the situation and characteristics of followers, by and large, the type of leader one is likely to become, and therefore the type of role (instrumental or expressive) that leader will fulfill in a group, can be determined by psychological testing. The suggestion that two leaders are required in a group stood in stark contrast to the idea that all leadership roles could be carried out by one individual.

Building on the work of Bales, the early Ohio State Leadership Studies (Fleishman, 1953) confirmed the conceptual distinction between task-oriented and relation-oriented leadership and developed a measurement tool for each. Over the next two decades, much of the leadership literature was focused around further defining the two dimensions. As a result of this work, task oriented leadership was identified as being concerned with production (Blake & Mouton, 1964), goal achievement (Cartwright & Zander, 1960; Bowers & Seashore, 1966), labor allocation and enforcement of sanctions (McGregor, 1960), and the initiating structure for followers (Shartle, 1950; Fleishman, 1953; Halpin & Winer, 1957). At the individual level, task-oriented leaders were said to have a high need for achievement (McClelland, 1961; Wofford, 1970), to be achievement oriented (Indvik, 1986), and to be cold and aloof to signal their preference for psychological distance from followers (Blau & Scott, 1962). Conversely, relations-oriented leaders were described as being focused on follower well-being (Hemphill, 1950), concerned
with developing and maintaining relationship (Hersey & Blanchard, 1982), to be more
democratic as opposed to autocratic (Bass, 1990), and as placing value on friendships, open
communication, and mutual trust. Empirical research has shown that relations-oriented leaders
are associated with higher job satisfaction and lower turnover in organizations (Bass, 1990; YUKL, 2006).


Table 2: Yukl (1999) taxonomy of task versus relations oriented leadership behaviors

<table>
<thead>
<tr>
<th>Task-oriented leader behavior</th>
<th>Relations-oriented leader behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plans in detail how to accomplish an important task or project.</td>
<td>Provides encouragement and support when you have a difficult or stressful task.</td>
</tr>
<tr>
<td>Provides a clear explanation of your responsibilities with regard to a task or project.</td>
<td>Backs you up and supports you in a difficult situation.</td>
</tr>
<tr>
<td>Clearly expresses what results are needed to carry out a task or project.</td>
<td>Gives you credit for helpful ideas and suggestions.</td>
</tr>
<tr>
<td>Determines what resources are needed to carry out a project.</td>
<td>Consults with you to get your reactions and suggestions before making a decision that affects you.</td>
</tr>
<tr>
<td>Determines how to organize and co-ordinate work activities to avoid delays, duplication of effort, and wasted resources.</td>
<td>Provides opportunities to develop your skills and show what you can do.</td>
</tr>
<tr>
<td>Checks work progress against plans to see if it is on target.</td>
<td>Expresses confidence in your ability to carry out a difficult task.</td>
</tr>
</tbody>
</table>

that when a leader is focused on task-oriented behaviors, their ability to attend to the relationship needs of their followers is diminished. Similarly, when followers are engage in task-related behaviors, their ability to attend to the relationship needs of the group is also diminished and vice versa. This is not to say that leaders do not have the ability to be highly analytical and to build effective relationships; rather that they cannot simultaneously attend equally to each of these tasks. This trade-off has been noted by a number of scholars, most recently Yukl (2008) notes that “efforts to improve one performance determinant may have an adverse effect on another performance determinant…when leaders are preoccupied with responding to external threats (task), there is less time for people-oriented concerns such as being supportive and developing member skills (p.711-714). The opposing domains hypothesis provides an alternative
explanation for why this the trade-off Yukl and others have observed. Rather than a lack of time, the opposing domains hypothesis suggests that it may be the suppression of the opposing neural network that is responsible for the “adverse effect on another performance determinant”.

The anti-correlation between the TPN and DMN may also help us to understand why the type of task a leader or group is charged with has been found to moderate the relationship between leadership style (task versus relationship), task performance and leadership effectiveness respectively. Two key studies in the early leadership literature present findings at the behavioral level which appear to parallel those of the opposing domains hypothesis. Specifically, Burke (1965) found that a group’s performance of a coding task was completed more effectively under a production-oriented (task) leader but the decision task was carried out more effectively under a relations-oriented leader. Linking this to the opposing domains hypothesis we could propose that the coding task presented to the group activated the TPN, and therefore suppressed the DMN. Followers performed more effectively on this analytical task when the leadership style matched the activation of the TPN (by focusing on the task). When a relations-oriented leadership style was used, the leader’s behavior and focus on relationships may have activated the DMN in followers, which we now know suppresses our analytical ability, hence the lower performance on the analytical task. Conversely, the decision task, which required interpersonal interaction and therefore would have activated the DMN, was performed more effectively under a relations oriented leader. A relations-oriented leader in this task would have allowed for the activation of the neural networks required to perform effectively. Conversely, a task-oriented leader would have activated the opposing network, resulting in lower task performance.
Building on the role of task type as a moderator of the relationship between leadership style and task performance, Weed, Mitchell, and Moffitt (1976) found that the type of task a group was faced with influenced their preference for a task as opposed to a relations oriented leader. They found that the only type of task that was a significant moderator between leadership style and task performance was the difficult-ambiguous task. While this study was focused on the difficulty and ambiguity of the task rather than the mechanical or social nature of the task, the authors note that the difficult-ambiguous task was the only task that involved ethical/moral problems and therefore “the significant findings on this task may be partially attributable to the types of skills required to deal with these problems” (p.65).

Aside from objective measures of task performance, Hersey and Blanchard (1969) developed the Tri-Dimensional Leadership Model that sought link task and relations oriented leadership styles to follower perceptions of leadership effectiveness. The Tri-Dimensional Leadership Model suggests that leaders who are highly task oriented will be perceived as ‘effective’ because they know what they want and are able to impose this to accomplish a task without causing resentment. A highly task oriented leader will be perceived as ineffective when followers’ perceive the leader has no confidence in others, is unpleasant, or only shows interest in short-run output. In other words, a highly task oriented leader will only be seen as effective if they are aware of, and attend to, relationships while still accomplishing the task. Similarly, a leader with a high relations-orientated will be perceived as effective by followers when followers perceive the leader has implicit trust in people and as being primarily concerned with developing their talents – behaviors associated with the DMN. They will be seen as ineffective when followers perceive the leader to be passive and showing little care about the task at hand – behaviors associated with the TPN. This suggests that regardless of a leader’s dominant style (task-
oriented or relations oriented), they must be able to switch between the opposing neural networks (the TPN and the DMN) in order to be perceived as effective by their followers. Given this, it seems that identifying the individual difference variables and situational variables that increase the ability of a leader to switch between the TPN and the DMN may be a critical step in maximizing leader effectiveness.


The late 1970s and early 1980s saw the rise of a “new paradigm” (see also House & Aditya’s 1997 “neo-charismatic” theories) of leadership theories which focused on the relational and emotional nature of leadership (Bryman, 1992). Included under in this new paradigm banner are leadership theories involving charisma (Conger, 1989, 1999; Conger & Kanungo, 1998; House, 1977), vision (Bennis & Nanus, 1985; Shashkin, 1988; Tichy & Devanna, 1986); and arguably the most well-known framework, Bass’ (1985) transformational-transactional framework. The key theoretical shift which characterizes the new paradigm models appears to be that rather than the utility of relationship building being task achievement as it was in the earlier task-relationship models, in the new paradigm models the leader-follower relationship itself became the variable of interest and the task-related benefits of the relationship appeared to be secondary. Task achievement and consequently task-oriented leadership moved to the periphery and in many cases appears to be framed as an inferior approach to leadership. In this section we will discuss two of the more famous new paradigm models: the transformational-transactional framework (Bass, 1985) and the leader-member exchange (LMX) framework (Graen, Novak, & Sommerkamp, 1982).
Transformational-transactional leadership

Transformational leadership was first mentioned by Dowton (1973, as cited in Bass & Bass, 2008) and was closely followed by the rise of charismatic leadership theory \(^1\) (House, 1977). There is still some debate in the literature as to the distinction, or more precisely the usefulness of making a distinction, between charismatic and transformational leadership. Some theorists argue that there is no empirical distinction between the two constructs (House, 1999; House & Shamir, 1993) and hence, much of the later literature refers to ‘Charismatic-transformational leadership’ (see for example Hunt, 1999; Kirkpatrick & Locke, 1996; Knippenberg & Sitkin, 2013). A second group of theorists continue to argue that there is value in distinguishing between charismatic leadership and transformational leadership, for example, Bass (1998) argues that while the same leaders who are charismatic also tend to be transformational, the behaviors and therefore development of the behaviors are different (see also Conger, 1999; Yukl & Beyor, 1999, as cited in Bass & Bass, 2008). Furthermore, Bass and Bass (2008) notes that it is possible to be transformational without being charismatic: “a highly intellectually stimulating teacher, for instance, may transform students without their regarding the teacher as charismatic (p.620). For the purposes of this paper, it is not necessary to draw conclusions as to the convergent of discriminant validity of the two constructs other than to note that both constructs draw heavily on social or relational reasoning as opposed to mechanical reasoning.

The transformational-transactional leadership framework is credited with “shifting the direction of leadership thinking from a utilitarian focus on influencing others….to an emphasis on the

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\(^1\) Although House and colleagues (1977; 1999; 1993) are largely credited with charismatic leadership theory, the concept was raised in the early work of Everett Hagan who framed charismatic leadership as an antidote to bureaucracy (Hagan, 1962). Even in this early framing we can see the tension between task (bureaucracy) and relationship.
importance of leadership as having a moral dimension and being concerned with the ‘greater good’ (Alimo-Metcalfe, 2013, p. 22). The framework contrasts three types of leaders: transformational, transactional, and laissez-faire. Transformational leaders are characterized as leaders who are able to motivate followers to view their work from new perspectives, who are aware of, and enact, the organization’s mission or vision, and who look beyond their own interests towards those that will benefit the group (Bass, 1985). In contrast, transactional leaders operate within the existing system, focus on time constraints and efficiency, and use adherence to process as a means for maintaining control (Bass, 1985). Transactional leaders are reliant on task structure to specify the “right way” to do things, and thus maintain a dependence on the leader for guidance on problem solutions (Lowe, Kroeck, & Sivasubramaniam, 1996). Finally, ‘laissez-faire’ leadership is characterized as leaders who “avoid making decisions, abdicates responsibility, and does not use their authority” (Antonakis, Avolio, & Sivasubramaniam, 2003: 265). Laissez-faire leadership has also been described as the ‘non-leadership’ (Tejeda, Scandura, & Pillai, 2001) and is widely agreed to be the least effective form of leadership (Bass & Bass, 2008; Antonakis, Avolio, & Sivasubramaniam, 2003; Tejeda, Scandura, & Pillai, 2001).

Transformational leadership and transactional leadership are commonly measured using the Multi-factor Leadership Questionnaire (MLQ) or variations of this instrument (for a review see Yukl, 1994). Using the MLQ, Bass (1985) found empirical evidence that transformational and transactional leadership are distinct, yet positively correlated dimensions (see also Lowe et al., 1996) – that is, that transformational leadership builds on transactional leadership rather than the alternative view as transformational and transactional leadership being at either end of a continuum (Burns, 1978). Bass (1985) consequently argued that a leader needs to exhibit both transactional and transformational competencies and that both are important for leadership
effectiveness. In support of Bass, empirical evidence can be found to support a significant association between both transformational leadership (Bass, 1998; Lowe et al., 1996; Skakon et al., 2010; Tims et al., 2011; Yukl, 1999), transactional leadership (Bass, Avolio, & Goodheim, 1987; Waldman, Bass, & Yammarino, 1990; Yammarino & Bass, 1990) and subordinate satisfaction and performance. This is consistent with the early views of Bales (1958) who argued that both task and relations oriented leadership are required for effective performance. In the following section, we describe in more detail the respective dimensions or factors of transformational and transactional leadership, identify the scale items currently used to measure each dimension, and discuss how these dimensions may map onto the opposing domains (the Task Positive Network (TPN) and the Default-Mode Network (DMN)) discussed earlier.

**Transformational leadership**

Transformational leadership comprises four dimensions: idealized influence (also known as charisma), inspirational motivation, intellectual stimulation, individualized consideration. *Idealized influence* was originally labeled ‘charisma’, however Bass and Avolio (1990) relabeled the construct due to the popularized connotation of charisma as being “celebrated, flamboyant, exciting and arousing” (Bass & Bass, 2008: 620), as well as being associated with Adolf Hitler’s treatment of the German people. Idealized influence is concerned with follower’s perception of the leader’s ability to instill a sense of pride, respect, and trust and to convey a collective sense of purpose and mission (Knippenberg & Sitkin, 2013). This dimension includes the leader showing high levels of integrity, being admired and respected by followers (Alimo-Metcalfe, 2013), being perceived as confident and powerful, and focusing on high-order ideals and ethics (Antonakis, et al., 2003). The items in the MLQ pertaining to this dimension include: “I go beyond self-interest
for the good of the group”; I act in ways that build others’ respect for me”; “I talk about my most important values and beliefs”; and “I consider the moral and ethical consequences of decisions”.

The second dimension of transformational leadership is *inspirational motivation*. This dimension refers to the way in which a leader energizes their followers by providing meaning, optimism, and enthusiasm towards a shared vision (Alimo-Metcalfe, 2013), stresses ambitious goals, and communicates to followers that the vision is achievable (Antonakis et al., 2003). In a recent critique, Knippenberg & Sitkin (2013) note that inspirational motivation and idealized influence (discussed above) are usually so highly correlated that they are combined into one “charisma” factor. However, as discussed earlier, for the purposes of this paper, the discriminant validity of interest is that between the DMN and the TPN, rather than that of constructs within each of these cognitive domains. We believe that both idealized influence and inspirational motivation are associated with social reasoning as opposed to mechanical reasoning, and more specifically, the DMN. The items in the MLQ used to measure inspirational motivation include: “I express confidence that goals will be achieved” and “I talk enthusiastically about what needs to be accomplished”.

*Intellectual stimulation* refers to a leader’s tendency to encourage followers to arrive at novel solutions (Alimo-Metcalfe. 2013), to use reasoning before taking action (Lowe, Kroeck, Sivasubramaniam, 1996), to challenge existing assumptions and beliefs, and to stimulate problem solving and creative consideration of issues (Antonakis et al., 2003; Knippenberg & Sitkin, 2013). The items in the Multi-factor Leadership Questionnaire used to measure this
dimension include: “I seek differing perspectives when solving problems” and “I suggest new ways of looking at how to complete assignments”.

The final dimension of transformational leadership is *individualized consideration*. This dimension is concerned with a leader’s recognition of the differing needs of followers (Knippenberg, & Sitkin, 2013), the creation of opportunities for development, coaching and mentoring (Alimo-Metcalfe, 2013), and the fulfillment of higher level needs such as self-actualization (Antonakis et al., 2003). Items in the MLQ pertaining to this dimension include: “I spend time teaching and coaching” and “I consider an individual as having different needs, abilities, and aspirations from others”.

**Transactional leadership**

In contrast to transformational leadership, transactional leadership is characterized by fulfillment of obligations, monitoring and controlling of outcomes (Antonakis, et al., 2003), and a quid pro quo relationship between leader and follower (Alimo-Metcalfe, 2013). Knippenberg & Sitkin (2013: 6) describe transactional leadership as “a more common and traditional form of leadership based on an exchange between leader and follower that speaks to follower self-interest”. Bass (1985) proposed three dimensions of transactional leadership: contingent reward, management by exception (active), and management by exception (passive).

*Contingent reward* refers to leader behaviors that clarify role and task requirements (Antonakis et al., 2003) and that punish or reward followers based on their accomplishment or otherwise of
contractual (task) obligations (Alimo-Metcalfe, 2103; Antonakis et al., 2003). Desired follower actions are rewarded, while the disapproved actions are punished. Items in the MLQ pertaining to this dimension include: “I discuss in specific terms who is responsible for achieving performance targets” and “I express satisfaction when others meet expectations”.

*Management by exception* is concerned with how leaders initiate and carry-out corrective behaviors. This dimension is generally considered as two factors: management by exception *active* and management by exception *passive*. Management by exception active has been referred to as a leader’s “active vigilance” (Antonakis et al., 2003: 265) and monitoring of performance to ensure that standards/tasks are achieved. In contrast, management by exception passive refers to a leader intervening only when a mistake has already occurred. Measurement of this dimension includes items such as: “I concentrate my full attention on dealing with mistakes, complaints, and failures”; “I direct my attention toward failures to meet standards”; “I wait for things to go wrong before taking action”; and I show that I am a firm believer in “If it ain’t broke, don’t fix it.”

*Transformational-Transactional Leadership and the Opposing Domains*

On the whole, the conceptualization and measurement of transformational leadership appears to represent a form of social cognition, or more precisely, the type of reasoning that would occur in the metalizing system (Jack et al., in press) and the Default-Mode Network (DMN), while transactional leadership appears to be more closely aligned with the Task Positive Network (TPN). Specifically, recall that the DMN is associated with reasoning about the mental states of others and reflecting on one’s own mental states. Items such as “I consider an individual as
having different needs, abilities, and aspirations from others” and “I talk about my most important values and beliefs” appear to be clearly linked to the Default Mode Network. However other items included in this construct do not map well. For example, “I express confidence that goals will be achieved” could be considered as a task-focused item due to the reference to goal achievement and “I suggest new ways of looking at how to complete assignments” and “I seek differing perspectives when solving problems” also appear to have a task focus, particularly if the leader is using these competencies with task achievement in mind.

In light of the work of earlier scholars who argued that both task and relationship are important components of leadership effectiveness, the inclusion of a few task-focused measures in the transformational leadership construct may in fact play an important part in the general finding that transformational leadership is more effective than transactional leadership (Bass & Bass, 2008). This view is consistent with that argued by Bass (1985) who suggested that transformational leadership augments transactional leadership rather than the two being on opposite ends of a continuum. Given that we now know that the type of task a leader is faced with impacts which neural network is activated and therefore which is suppressed, it would be interesting to further explore the effect sizes of each factor of the transformational scale based on whether the task is analytical or social in nature. We would expect that when faced with an analytical task, the task-focused items would explain a greater amount of variance in leadership effectiveness than they would in a social or relational task.

To further complicate the matter, multiple studies have found that one factor of the transactional leadership function loads strongly with the transformational factors which has led some scholars
to rightly question the discriminant validity of the MLQ. As noted by Kuvaas and colleagues (Kuvaas et al., 2012: 758), transactional leadership as measured by the MLQ “seems to represent two separate factors; one of which loads with transactional subscales, and one of which loads with transformational subscales (Goodwin, Wofford, & Whittington, 2001). Accordingly, these scales represent both the social and the economic sides of exchange relationships”. The opposing domains hypothesis suggests that this cross-loading of items should be greater when the task is analytical in nature or when followers have a high need for achievement.

**Leader-member exchange versus Leader-member social exchange**

Alongside the development of the transformational-transactional framework, Graen, Novak, & Sommerkamp (1982) introduced the Leader Member Exchange (LMX) framework which focuses on the differential quality of the relationship between leader and follower. The LMX framework departed from the ‘average leadership style’ argument, which assumes that leaders adopt an ‘average’ style, in that the relationship they form with each follower is of equal quality. In contrast, the LMX framework suggests that the quality of a leader’s relationships is different for each follower and is largely dependent on whether the follower is ‘in-group’ or ‘out-group’. Low quality relationships are based on the transactional part of the employment contract while high quality relationships are based on mutual liking, trust, and respect (Graen, Novak, & Sommerkamp, 1982).

LMX grew from an earlier framework known as the Vertical Dyad Linkage (VDL), which some have argued was the first relationship-based leadership framework (Schriesheim, Castro, & Cogliser, 1999). While the LMX framework introduced some new variables and measures of
relationship quality, the underlying assumptions of the VDL framework and the LMX framework remained similar. Namely, a leader and follower will not engage in a relationship without (a) mutual respect for the capabilities of the other, (2) the anticipation of deepening reciprocal trust with the other, and (3) the expectation that interacting obligation will grow over time as career-oriented social exchanges blossom into a partnership (Graen & Uhl-Bien, 1995: 237). The literature also presents a second theoretical framing of LMX, which adopts a social exchange perspective and argues that while competence (mutual respect for capabilities) may be a component in a social exchange, it is not a prerequisite to entering into a social exchange with a leader (Bernerth, Armenakis, Field, Giles, & Walker, 2007). It is this distinction between the VDL theoretical framing of the LMX framework and the social exchange perspective of the LMX framework that lead to the development of Leader-Member Social Exchange (LMSX), which sought to reconcile inconsistencies in the operational definition and measurement of LMX. Bernerth and colleagues (Bernerth, et al., 2007) argued that the current measures of LMX reflected the VDL theoretical framing of LMX rather than the social exchange perspective: “researchers who use social exchange as a basis for building models, and subsequently measure a different construct (i.e. VDL), are not advancing our understanding of the social exchange between subordinates and supervisors” (Bernerth et al., 2007: 980). The LMSX measure was designed to specifically capture the social exchange component of the leader follower relationship.

In summarizing the development of the LMX-LMSX literature, we might conclude that there are currently two theoretical and empirical conceptualizations of the leader-follower relationship: LMX and LMSX. The LMX framework is based on the original assumptions of the VDL framework and thus has a key assumption that follower competence is a pre-requisite for a social
exchange between leader and follower. There are a number of measures in the literature for this conceptualization of LMX, the most common being the LMX7 and the LMX-MDM. In contrast, LMSX is based on the social exchange component of the leader follower relationship, therefore follower competence is not considered a prerequisite of the exchange relationship. Table 3 presents the scale items for two different measures of LMX and for LMSX. In examining the scale items it appears that the LMX and LMX-MDM scales are more relational in nature while the LMSX scale is transactional in nature. Indeed the developers of the LMSX measure noted that the use of the social exchange perspective of LMX raises “an interesting theoretical question, that is, whether or not a social exchange relationship based on feelings of obligatory repayment is necessarily a good thing” (Bernerth et al., 2007). Bernerth and colleagues argue that while the LMSX measure may appear transactional, the lack of intentionality and certainty in the exchanges moves the relationship beyond the transactional level and allows for feelings of gratitude, trust, and loyalty. However, when examining the measure used, a person who scored high on the LMSX scale does not seem to reflect any form of uncertainty or lack of intentionality, rather a high score on this measure appears to reflect a certain expectation of a transactional relationship, which according to the VDL conceptualization of LMX, would suggest a low-quality relationship. The opposing domains hypothesis suggests that the intentionality of the leader or follower is indeed a critical determinant of the quality of the relationship that is formed. A leader-follower relationship based on an expectation of exchange would place both parties in the Task Positive Network, which actually inhibits the ability of each party to engage in social reasoning – which one would assume is critical in relationship formation.
We could also argue that framing a relationship as a transactional exchange may result in higher levels of leadership effectiveness in a task-oriented or highly analytical context due to the activation of the Task Positive Network (TPN), which is congruent with the network required for task performance; however in a relational context in which the Default Mode Network (DMN) is the dominant neural network, a transactional framing of the leader-follower relationship would suppress the DMN, which would lead to lower task performance (because the task is social or relational in nature and thus requires the DMN). In other words, we would not expect LMX as measure by the LMX-7 or the LMX-MBM to have a positive relationship with task performance when the task is analytical, however when the task is relational in nature we would expect a positive relationship between LMX and performance. Interestingly, the early literature does offer some support for this premise: Vecchio (1982) examined the relationship between LMX and task performance of 48 Air Force enlisted men on a training simulation game (analytical task) and found no significant relationship. Similarly, Vecchio and Gobdel (1984) examined the relationship between LMX and bank teller performance (teller difference) and also failed to find a significant relationship. More recently, Gerstner and Day (1997) conducted a meta-analysis which included 79 studies and found a small, non-significant correlation between LMX and objective performance ($r = 0.11$, further reduces to $r = .07$ after the removal of one outlier), however stronger relationships were found between LMX and relational performance indicators such as organizational commitment ($r = 0.42$).

Recent literature has begun to explore the possibility that both economic (also called instrumental and/or transactional) and social components of a leader-follower relationship can have positive consequences on task performance. For example, Kuvaas et al., (2012) differentiate between ‘social leader member exchange; (SLMX) and ‘economic leader member
exchange (ELMX) and argue that social and economic relationships should not be considered at either end of the quality continuum, rather they reflect different types of relationships. Kuvaas and colleagues cite Goodwin et al. (2009: 973) who argued that the “instrumental and social aspects of the relationship appear to exist simultaneously...although one form of LMX probably dominates over the other.” (Kuvaas et al., 2012: 761). At this stage, the literature has not considered the conditions under which an economic exchange relationship (ELMX) is beneficial to task performance and leadership effectiveness as opposed to a social exchange relationship (SLMX), however as suggested above, we belief that the type of task and the aspects of performance being measured (analytical versus relational) might be a useful starting point.
Table 3: Scale items for common measures of LMX and LMSX

| I usually know where I stand with my manager.  | I like my supervisor very much as a person.  | If my manager does something for me, I will return the favor at some point.  |
| My supervisor understands my problems and needs well enough.  | My supervisor defends my work actions to a superior, even without complete knowledge of the issue in question.  | My manager and I have a two-way exchange relationship.  |
| My supervisor recognizes some of my potential.  | My supervisor would come to my defense if I were ‘attacked’ by others.  | I do not have to specify the exact conditions to know my manager will return a favor.  |
| Regardless of how much power my manager has built into his or her position, my manager would be personally inclined to use his/her power to help me solve problems at work.  | My supervisor is the kind of person one would like to have as a friend.  | If I do something for my manager, he or she will eventually repay me.  |
| I can count on my supervisor to ‘bail me out’ at his/her expense when I really need it.  | My supervisor is a lot of fun to work with.  | I give more than I take with my supervisor (R)  |
| I have enough confidence in my supervisor to defend and justify his/her decisions when he/she is not present to do so.  | My supervisor would defend me to others in the organization if I made an honest mistake.  | My opinion has an influence on my manager, and his or her opinion has an influence on me.  |
| My working relationship with my supervisor is effective.  | I respect my supervisor’s knowledge of and competence on the job am willing to apply extra efforts, beyond those normally required, to further the interests of my work group.  | I have a balance of inputs and outputs with my manager.  |
|  | I do work for my supervisor that goes beyond what is specified in my job description.  | When my supervisor gives me support, I feel I owe it to him or her to return the favor.  |
|  | I am impressed with my supervisor’s knowledge of his/her job.  | My efforts are reciprocated by my manager.  |
|  | I admire my supervisor’s professional skills.  | My relationship with my manager is composed of comparable exchanges of giving and taking.  |
|  |  | When I give effort at work, my manager will return it.  |
|  |  | Voluntary actions on my part will be returned in some way by my manager.  |
DISCUSSION: RESOLVING THE TENSION

The previous section has shown that the distinction between task and relationship competencies is clearly delineated throughout the leadership literature, however the exact nature and consequences of this dichotomy has received little attention. In this section, we present potential strategies to resolve, or at least minimize the consequences of the tension leaders face between attending to task requirements and attending to relationships as a result of the antagonism between the TPN and the DMN. First, we consider the possibility that leaders have a neural predisposition towards either the TPN or the DMN. We then explore how we might be able to minimize the extent of the suppression of the opposing network. Specifically, we argue that a number of individual difference variables and situational variables may moderate the relationship between the type of task a leader is faced with and the extent to which one network is activated and the other suppressed. Finally, we argue that a leader’s ability to switch between the TPN and the DMN is critical for leadership effectiveness.

Neural disposition: matching the leader to the situation

As with hormonal disposition, there is some evidence to suggest that humans have a natural disposition towards either analytical-mechanical reasoning and therefore the Task Positive Network (TPN) or social-relational reasoning and therefore the Default Mode Network (DMN) (Jack et al., 2013). While neural disposition is a relatively nascent area, hormonal dispositions are well documented in the literature (see for example, Insel, 1997; Schulkin, J. 1999). Among the body of work on hormonal disposition, people with higher unconscious power motives have higher resting levels of epinephrine secretion, and people with higher unconscious Need for Achievement motives appear to have higher resting levels of vasopressin secretion (Boyatzis et
al., 2012; Boyatzis & Sala, 2004)). At the behavioral level, neural and hormonal dispositions may underlie certain personality characteristics, learning styles, and perhaps preferred leadership style.

The idea that leaders have a natural or preferred leadership style is an assumption underlying many of the trait and contingency leadership models. The early leadership literature offers a vast array of research geared toward identifying an individual’s disposition for leadership including physical characteristics (Bernard, 1928 as cited in Bass & Bass, 2008), extroversion (Goodenough, 1930 as cited in Bass & Bass, 2008), optimism (Drake, 1944 as cited in Bass & Bass, 2008); task-related personality characteristics (Cummings & Scott, 1965; Medow & Zander, 1965; Judge, Bono, Ilies, et al., 2002); social personality characteristics (Krumboltz, Christal, & Ward, 1959; D.S. Brown, 1964). However, as with much trait-based research, for every study finding support for trait based hypotheses there was another that failed to find support. In an attempt to reconcile inconsistent findings, scholars began to consider the interaction between the leader and the situation (Stodgill, 1948). The ‘pure’ situational approaches to leadership argued that effective leadership is not a result of personality, drive, or ability, rather effective leadership is a product of the right “time, place, and circumstance” (Bass & Bass, 2008: 52). However, as with the pure trait theories, situation alone did not provide consistent evidence of effective leadership, which lead to the emergence of the person-situation theories which posited that a good ‘fit’ between person and situation was the key to effective leadership (Boyatzis, 1982).
The person-situation fit approach to leadership was a dominant approach from the 1970s (Bass & Bass, 2008) and laid the foundations for the introduction of follower characteristics and relational frameworks that emerged in the new paradigm models (see earlier discussion of transformational-transactional leadership and leader-member exchange). Considering the opposing domains hypothesis, one way to relieve the tension between the task and relational components of leadership could be to match a leader’s predisposition towards the task or relationship to the type of task they. In many ways, Bales’ (1958) suggestion of the need to two leaders was an attempt to do this. The utility of matching a leader’s competency (task or relationship) to the situation has found some empirical support in the literature. For example, Slatter (1955) found that when task demands are high, being liked does not contribute to leadership effectiveness and social or relational skills are not highly valued, whereas in therapy groups, sensitivity training groups, and social clubs socio-emotional skills were important.

While matching the leader to the type of task may provide some performance benefits, from a practical standpoint, this is virtually impossible as task requirements are constantly toggling between task and relationship. An alternative to approach is to train and develop leaders so that they possess a high level of competency in both domains. Neuroscience literature suggests that while a leader may prefer or have a disposition toward either the TPN or the DMN, these dispositions can be changed through training and experience – a phenomenon known as plasticity. Therefore, a disposition toward either task or relationship does not preclude a leader from developing their abilities in the opposing domain. In fact, we believe that this development is a critical component in allowing a leader to effectively switch between the TPN and the DMN.

Neural resource efficiency
The opposing domains hypothesis could be framed as presenting a form of ‘trade-off’ between engaging in task-related leadership activities and engaging in relationships building activities. In this framing, neurological activation is essentially a form of resource which leaders can use to attain or increase their effectiveness. When the leader expends more neurological resources attending to relationships, they consequently have fewer resources to invest in the analytical components of the task and vice versa. In this framing, Bales’ (1958) assertion that in order to maximize performance we need two leaders – one to deal with the task and the other with relationships - essentially translates to increasing the neurological resources available to the group by introducing another leader, while holding the efficiency or rate of each leader’s uses of these resources constant. An alternative strategy is that we change the rate or efficiency of the leader’s neurological resources thereby minimizing the extent of activation required to successfully complete the task. Because the task network (TPN) and the social-relational network (DMN) are anti-correlated, minimizing the degree of activation in one network also serves to proportionality decrease the suppression of the opposing network.

When faced with an analytical task, a leader will require a certain degree or level of activity in the TPN in order to successfully complete that task. The degree of activation required will depend on a number of individual difference characteristics and a number of situational contingencies. Any variables which influence the amount of cognitive effort required to successfully complete the task will moderate the relationship between type of task and the degree of activation of the corresponding network. For example, when faced with a mathematical problem, a leader with a high level of mathematical skills will activate their TPN to a lesser degree than a leader without such skills. Consequently, this leader’s opposing network (the DMN) will be suppressed less, allowing the leader to invest relatively more neurological
resources in maintaining high quality relationships with followers despite the presence of a highly analytical task. Other task-related variables that might moderate the relationship between analytical/mechanical tasks and the degree of activation of the TPN include cognitive intelligence, emotional intelligence (as opposed to social intelligence, see Boyatzis & Sala, 2004), task competence, task difficulty, and the degree to which the task is ‘routine’. Conversely, when faced with a social/relational task, the moderating variables would be those individual difference variables or situational variables that would result in a decrease of activity in the Default Mode Network, resulting in less suppression of the Task Positive Network. Such variables might include a leader’s social intelligence, personality (extroversion) and the pre-existing relationship quality (Figure 10 provides a visual representation of these relationships).

**Task Positive Network Competencies**

**Individual difference variables**

*Cognitive intelligence*

We expect that leaders with a high level of cognitive intelligence (commonly referred to as ‘g’) will show greater ability in analytical or mechanical type tasks. Cognitive intelligence tests generally draw heavily on logic problems and reasoning about inanimate objects rather than moral problems or reasoning about emotions (Lubinski, 2004) which is the type of reasoning associated with the Task Positive Network (TPN). Thus, when faced with an analytical or mechanical task, we expect leaders high levels of cognitive intelligence will require less ‘effort’ or neurological resources to successfully complete the analytical or mechanical task than leaders with lower levels of cognitive intelligence:
P1: A leader’s cognitive intelligence moderates the relationship between analytical task and the degree to which the TPN is activated. To successfully complete an analytical task, leaders with higher cognitive intelligence will show less activity in the TPN than those with low cognitive intelligence.

Task competence

A leader who shows a high level of competence in a given task will require less neurological resources than leaders with a lower level of competence. Competence may be a result of experience or other skills and abilities. A high level of task competence will result in the leader experiencing the task with less intensity resulting in a lower level of activation in the TPN. Thus,

P2: A leader’s level of task competence moderates the relationship between analytical task and the degree to which the TPN is activated. To successfully complete an analytical task, leaders with higher task competence will show less activity in the TPN than those with low task competence.

Emotional intelligence

Our justification for including emotional intelligence in the TPN as opposed to the DMN is discussed earlier in the paper, however, in short, when a leader uses sense-making around the emotions of as a strategic tool to achieve the task, the neuroscience literature suggests that are operating in the task domain (TPN) rather that the social (DMN). We expect that when faced
with an analytical task, leaders with high emotional intelligence will require less cognitive effort to engage followers than leaders with low emotional intelligence:

\[ P3: \text{A leader’s emotional intelligence moderates the relationship between analytical task and the degree to which the TPN is activated. To successfully complete an analytical task, leaders with higher emotional intelligence will show less activity in the TPN than those with low emotional intelligence.} \]

**Situational variables**

*Task difficulty*

The inclusion of task difficulty as a situational variable rather than an individual difference variable (in which case task difficulty would be the ‘perception’ rather than an objective measure) is based on the assumption that there is some objectivity in the difficulty of an analytical task. For example, there are ‘easy’ mathematical problems which would be classified as easy by the large majority of the adult population, and there are ‘difficult’ mathematical problems which would be experienced as such by the majority of the population. Holding competence, experiences, and intelligence constant, more difficult tasks will require more effort or neurological resources than easy tasks.

\[ P4: \text{Task difficulty moderates the relationship between analytical task and the degree to which the TPN is activated. Leaders faced with a difficult analytical task will show more activity in the TPN than leaders faced with an easy analytical task.} \]

*Routinization*
We expect that leaders faced with familiar or routine task will show less activity in the TPN than when faced with novel or new tasks. This proposition is closely linked to the learning cycle – when a task is new it requires greater cognitive effort than when a task is familiar. For example, when learning to drive, the require attention on the ‘task’ of driving is high, which leaves less neurological resources for holding a conversation with passengers. Perhaps this is why learner drivers are prohibited from carrying passengers in many countries. As driving becomes more routine or familiar, the ‘task’ component requires less neurological resources to achieve the same level of performance, which allows drivers to hold conversations and while simultaneously engaging in the analytical task. We expect this logic also applies to the daily work of leaders in that when analytical tasks are routine, leaders will require less neurological resources to attain a given level of performance in that task, and will therefore show less activity in the TPN. Thus,

\textit{P5: The extent to which an analytical task is routine in nature moderates the relationship between analytical task and the degree to which the TPN is activated. Leaders faced with a routine analytical task will show less activity in the TPN than when faced with a non-routine task.}
Figure 10: Proposed conceptual model

TPN Competencies
- Individual difference variables:
  - Cognitive Intelligence (P1)
  - Emotional Intelligence (P2)
  - Task competence (P3)
  - Situational variables:
    - Task difficulty (P4)
    - Routinization (P5)

DMN Competencies
- Individual difference variables:
  - Social intelligence (P6)
  - Personality—Extroversion (P7)
- Situational variables:
  - Existing relationship quality (P9)

Analytical Task / Mechanical Reasoning
- Degree of Activation of Task Positive Network
- Degree of Suppression of Default Mode Network

Relational Task / Social Reasoning
- Degree of Activation of Default Mode Network
- Degree of Suppression of Task Positive Network

Leadership Effectiveness
- Speed and ability to switch between TPN and DMN
- Timing of switch

(P10)

(P9)
Default Mode Network Competencies

*Individual difference variables*

*Social intelligence*

Social intelligence refers to how people handle relationships, their awareness of the needs and concerns of others, and their ability to induce desirable responses in others (Boyatzis, 2011). We believe that leaders with a high level of social intelligence are likely to feel more comfortable in a social or relational task and will likely to perceive that task as less challenging and less intense than a leader with low social intelligence. Thus, when faced with a social or relational task, we expect leaders with high social intelligence (as opposed to emotional intelligence - see Boyatzis & Sala, 2004) to require less neurological resources to successfully complete the task relative to those leaders with low social intelligence.

*P6: Social intelligence moderates the relationship between social tasks and the degree of activation of the Default Mode Network. When faced with a social task, leaders with high emotional-social intelligence will show less activity in the DMN than those with low emotional-social intelligence.*

*Personality*

When faced with a social or relational task, leaders with an extroverted personality are expected to show less neurological activation in the DMN than leaders with an introverted personality. Extroverts enjoy and derive energy from engaging in social or relational tasks (Barrick & Mount, 1991), which we suspect would be reflected in a lower level of activation in the Default Mode Network. Conversely, introverts find social interactions to
be energy depleting and would therefore find social or relational tasks more demanding, which we believe will result in higher levels of activation in the Default Mode Network when faced with such tasks. Thus,

\[ P7: \text{Personality moderates the relationship between social tasks and the degree of activation of the Default Mode Network. When faced with a social task, extroverts will show less activity in the DMN than introverts.} \]

**Situational variables**

When faced with a social or relational task, we expect leaders who have already developed high quality relationships with their followers to show less activity in the Default Mode Network. High quality leader follower relationships are characterized by mutual trust, respect, and obligation and followers are seen as ‘trusted assistants’ while low-quality leader follower relationships are characterized by low trust, respect and obligation and followers are seen as ‘hired hands’ (Zalesny & Graen, 1987). In order to successfully complete a social or relational task, we expect that established high-quality leader follower relationships will reduce the difficulty and intensity of the task, thus reducing the degree of activation of the Default Mode Network:

\[ P8: \text{Existing relationship quality moderates the relationship between social task and degree of activation in the Default Mode Network. When faced with a social task, leaders with high quality relationships with their followers will show less activity in the Default Mode Network than those with low quality relationships with their followers.} \]
Switching between the TPN and DMN

The idea that a task can be classified as either analytical or social is useful for theoretical purposes; however as with most dichotomies, the distinction is rarely this clean-cut. In reality, and particularly in the context of leadership, all tasks have a relational component and an analytical component. Given this, a leader’s ability to switch between the Task Positive Network and the Default Mode Network becomes key consideration. We suspect that minimizing the suppression of the opposing network will make it easier, faster, and less costly for the leader to switch between the two networks. For example, we have already argued that leaders with certain social competencies require less cognitive effort to complete a social task than those without these competencies resulting in less activation of the DMN and less suppression of the TPN. Hence, the difference or gap between the two networks is reduced which would make switching between the two networks faster and less costly. Reducing the gap between the two networks could also be viewed as reducing the intensity at which a leader experiences the task. There is an optimal level of intensity that allows a leader to switch relatively effortlessly between the TPN and the DMN allowing them to attend to task requirements and relationships. Additionally, the ability to sense the optimal timing the switch in relationship to task demands, their own needs, and the needs of their followers may also be a critical component in understanding leadership effectiveness. For example, in the context of learning a new task, interruptions can be extremely costly, not only in terms of task outcomes (errors) but also in the ability to ‘pick up where you left off’. Once a person has gained a higher level of mastery, interruptions will be less costly and following the interruption, the person will be able to re-engage with the task faster.
Prior research on the intensity of emotions suggests that in order to move a person from a negative emotional state (NEA) to a positive emotional state (PEA), the intensity of the emotion must be reduced to reach a tipping point. (Boyatzis, 2013; Boyatzis et al., 2012). It seems reasonable to suggest that a similar principle exists for switching between that TPN and the DMN. Boyatzis (2013) argues that when people are in the Positive Emotional Attractor they are “more perceptually open and accurate in perceptions of others” (p. 1978; see also Boyatzis et al., 2012; Fredrickson & Branigan, 2005), which is consistent with the work of the DMN in allowing individuals to engage in reasoning about the emotions of others. In contrast, the Negative Emotional Attractor is said to be linked to human survival, particularly to defend against threats. Additionally, the NEA balances “unchecked optimism” which has been linked to poor investment decisions (Gibson & Sanbonmatsu, 2004). – an analytical task that would require activation of the TPN rather than the DMN. The link between the PEA-NEA and the TPN-DMN is also reflected in Fiedler’s Cognitive Resources Theory (1986). Fiedler & McQuire (1987, as cited in Bass & Bass, 2008) found that under non-stressful conditions, leaders with fluid intelligence (IQ) perform better than leaders with crystallized intelligence (experience); however under stressful conditions, leaders with crystallized intelligence performed better. Cognitive resource theory posits that the reason for this distinction is that under stressful conditions, a leader with fluid intelligence will rely on intellectual solutions to a task even when such solutions are inappropriate. In other words, under stressful conditions, a leader is ‘stuck’ in the Task Positive Network (TPN) and also in the Negative Emotional Attractor due to the stress condition, which limits their ability to switch into the DMN and the Positive Emotional Attractor to explore non-intellectual solutions. Leaders with crystallized intelligence (intelligence based on past experience and learning) are likely to experience the same situation with less intensity,
thus these leaders will be 1) closer to the NEA-PEA tipping point and 2) more able to switch between the TPN and the DMN. Thus,

\[ \text{P9: Reducing the degree of activation in the dominant network and therefore minimizing the degree of suppression of the opposing neural network will increase the ability of a leader to switch between the Task Positive Network and the Default Mode Network and increase the speed at which they are able to do so.} \]

Given that leadership almost always requires consideration of both task requirements (TPN) and relationships (DMN), it follows that the greater ability a leader has to switch between these two modes of thinking the more effective they will be as a leader. The importance of a leader being able to ‘switch’ between opposing states has been discussed in the literature and has more recently been referred to as ‘dual tuning models’. George and Zhou (2007) found that both positive and negative moods have a strong positive correlation with creativity and that supervisors can create a context that supports both states by offering developmental feedback, displaying interactional justice, and by being trustworthy (see also George, 2011). Along with the ability to switch between the two opposing networks, which we argued requires a reduction in intensity of the dominant network, we also expect the ability to appropriately time the shift from task to relationship to be important both in terms of minimizing disruption for followers and for maximizing the effectiveness of the shift. For example, knowing that activation of the Default Mode Network suppresses our analytical-mechanical reasoning abilities (Jack et al., 2013), it would be unwise for a leader to engage followers in activities requiring social or relational reasoning at a time in which distraction from the task could result in serious consequences. Similarly, in situations in which require social or relational reasoning, for example during the group formation period, introducing task-focused activities may inhibit
relationship development in the group. The timing of the switch may also have implications for the timing of feedback. Based on the opposing domains hypothesis, the closer the time period between action and feedback, the more congruence there should be between the type of feedback and the type of task. For example, if feedback is being given while a person is performing an analytical task, the feedback given should be analytical or technical in nature as this type of feedback is consistent with the neural network the receiver is engaged in. If the leader wishes to give feedback that requires the follower to engage in social or relational reasoning, they would be better to wait until the receiver has disengaged from the analytical task. The same can be said for giving task-related feedback in an emotionally charged situation:

\[ P10: \text{The ability of a leader to switch between the Task Positive Network and the Default Mode Network is positively related to leader effectiveness.} \]

\[ P10a: \text{The timing of the shift between the Task Positive Network and the Default Mode Network Moderates the relationship between the ability to switch between networks and leadership effectiveness.} \]

Given that the decision to switch from one cognitive domain to another requires reasoning about the emotional state of self and others, leaders with greater Default-Mode Network abilities are likely to be more able to successfully time the shifts than leaders who lack such abilities. Thus,

\[ P10b: \text{Leaders who have greater Default-Mode Network abilities will be more able to gauge when a shift is necessary and/or appropriate.} \]
CONCLUSION

The distinction between task and relationship in the leadership literature can be traced back to the early 1900s with the shift from scientific management to the human relations movement. This distinction still exists in modern day leadership frameworks yet little consideration has been given to the exact nature of the relationship between task-oriented reasoning and social and relational reasoning. Recent findings in the neuroscience domain have shed light on this relationship; specifically, analytical (task) reasoning and relational (social) reasoning are in fact to two distinct anti-correlated cognitive modes (Jack et al., 2013). This paper has explored the possible implications of this finding (known as the ‘opposing domains hypothesis’) for leadership. We began our discussion with a brief review the early task-oriented approaches to leadership and examined the early frameworks that made clear distinctions between task and relationship along with various attempts at understanding the implications of each for leadership effectiveness. We then moved to review the ‘new paradigm’ leadership frameworks, which place a greater emphasis on the relational components of leadership. We focused specifically on Bass’ transformational-transactional framework and the LMX-LMSX distinction. From this review we could clearly see not only that the distinction (and in the later models blurring) of task-oriented and relationship-oriented leadership behaviors is delineated throughout the leadership literature, but also that both appear to be critical components of leadership effectiveness. With this in mind, the final section of the paper presented a series of propositions regarding how leaders may be able to maintain a degree of balance between the two cognitive domains by reducing the degree of activation in the dominant network and consequently minimizing the suppression of the opposing network, which we argued would allow them to switch efficiently and effectively between task and relationship demands.
Theoretical contribution and practical implications

This paper has identified a key pattern in the leadership literature and linked this pattern to cutting edge research in the neuroscience domain. In doing so, we have raised a number of questions regarding our treatment of the task and relationship distinction in the literature to date, particularly the assumption that leaders are able to attend to both domains simultaneously. Additionally, we have been able to add further explanation to some historical findings attempting to understand the interaction between task, leadership style and leadership effectiveness. Finally, we suggested an array of propositions that might extend our current conceptualization and operationalization of leadership effectiveness.

From a practical standpoint, this paper suggests that developing a leader’s analytical and relational abilities may be an important way to minimize the anti-correlation between the Task Positive Network and the Default Mode Network, and in doing so, will allow leaders to switch between the networks more efficiently. We believe that the ability to switch between these networks may be a key component of leadership effectiveness and that this ability is one that can be acquired through leadership training and development programs. Additionally, knowing that engagement in analytical tasks inhibits our ability to engage in social or relational reasoning and vice versa may have important implications for organizations in terms of how they structure and order tasks that have analytical and relational components. For example, when giving feedback, managers should consider if the feedback is analytical or task related in nature or interpersonal in nature and time the delivery of that feedback accordingly. The same may be said for the ordering of meeting agendas and performance review meetings.
Future research

While this paper has focused specifically on the implications of the opposing domains hypothesis for leadership, we believe that the distinction and anti-correlation between analytical-mechanical reasoning and social reasoning exists in many other areas in the organizational behavior domain. These areas include, but are not limited to, conflict management, trust, and moral reasoning. For example, distinctions in the literature have been made between cognitive and relational trust (Lewis & Weigert, 1985); cognitive conflict and affective conflict (Jehn, 1997; De Dreu & Weigert, 2003); empathy and dehumanization (Haslam, 2006).

Relevant to the leadership domain specifically, further testing is needed in order to understand which individual difference variables are most important in facilitating the shift between the two networks. Once we have more information on this we will be able to target these variables in leadership development training programs. Additionally, manipulation of situational characteristics within each type of task, for example task difficulty and routineness for analytical tasks, and prior relationship quality for social tasks will allow us to isolate the key situational variables at play. Finally, further research on the link between hormonal systems and neurological systems would allow us to understand how tipping points in hormonal systems influence neurological tipping points.
REFERENCES


