

The Relationship between Thinking Styles and Transformational Leadership moderated by the expression of positive emotion.

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Management Summary

Background: Many organizations face the challenge of appropriately training their talents to become good leaders and the recruitment of good leaders becomes increasingly difficult, too. Nevertheless, having good leaders in one's organization is essential.

Specifically having transformational leaders is the deciding factors driving innovation. Transformational leadership (TL) defines leaders who can transform their employees' motivation from working for a mere paycheck towards working for achieving a better organizational future. They manage to support their employees on the one hand and challenge them to think outside the box on the other. Indeed, TL is associated with beneficial outcomes, like employees experiencing greater overall job satisfaction and being more satisfied with their leaders. Moreover, organizational performance is better and TL drives innovation.

Recently, thinking styles gained more attention in understanding who is likely to be a transformational leader. Thinking styles describe individual preferences, regarding how to interpret information from people's environment and how to interact with it. There are four thinking styles: *Rationality* describes the preference to employ logic in decision-making. *Imagination* describes the preference to think visually. *Intuition* describes the preference to rely on one's "gut-feeling". *Emotionality* describes the preference to let emotions guide ones decision-making.

Taken this information together, the study connects TL with thinking styles to help organizations understand how transformational leaders can be trained and who is likely to become one. Hence, this study investigates the relationship between thinking styles and TL.

Additionally, the expression of positive emotion is of special interest here, because TL is only associated with positive emotion, whereas the thinking style emotionality assesses positive and negative emotionality as well as their strength and duration. .

Method & Results: In total, 95 leaders (75.8% male, 60% between the age of 36 & 55, 45.3% in a high leading position) filled out a survey to assess their level of TL-skills, their thinking styles and to what degree they express positive emotion.

The results indicate that intuition and imagination are not significantly related to TL, but rationality is. Moreover, only for leaders with high expression of positive emotion there is a relationship between emotionality and TL.

Conclusion & Recommendations: The results indicate that rationality, or the ability to think analytically relates to TL and that for leaders with high expression of positive emotion, emotionality plays a role in TL.

With this knowledge recruiters can identify candidates with a greater likelihood to become a transformational leader. More specifically, they can assess the candidates' level of rationality and expression of positive emotion with the items used in this study. Nevertheless, recruiters have to keep in mind that candidates sometimes give socially desirable answers.

A second recommendation can be made for TL trainings. There is already a training that increases leader's use of TL skills that focuses on training leaders' use of rationality. In the future, this training can be expanded by including a unit on the expression of positive emotion to train leaders to show higher expression of positive emotion to increase their TL skillset.

Abstract

This study tests the cognitive experiential leadership model (CELM), which proposes that three out of four thinking styles (i.e. rationality, imagination and emotionality) are positively related to transformational leadership (TL). So far, studies investigating these relations have found mixed results. Moreover, the relation between the fourth thinking style, intuition, and TL is investigated. The proposed relationship between emotionality and TL is expected to be positively moderated by the *expression of positive emotion*. Leaders filled out questions about thinking styles, transformational leadership and expression of positive emotion anonymously (N = 95). The results indicate that there is a positive and significant relation between rationality and transformational leadership and that the moderator *expression of positive emotion* positively influences the relationship between emotionality and TL. The relation between intuition and TL as well as imagination and TL could not be supported. Practical implications for the training of transformational leaders and the recruitment of (future) transformational leaders are discussed.

Keywords: transformational leadership, thinking styles, expression of positive emotion

Recruitment departments struggle to find good leaders in the ongoing "war for talent" (Schwarz, Roy, Hauptmann, & van Durme, 2019). Moreover, the HR departments are challenged with continuously developing their leaders (Schwarz et al., 2019). Nonetheless, having good leaders in one's organizations is important (Anthony & Schwartz, 2017).

Specifically having transformational leaders is one of the decisive factors driving innovation in organizations (Anthony & Schwartz, 2017). Additionally, TL relates to job satisfaction and performance, leader satisfaction and organizational performance (Dvir, Eden, Avolio, & Shamir, 2002; Judge & Piccolo, 2004; Sethibe & Steyn, 2015). In general, TL is

well researched (Dinh et al., 2014; Sethibe & Steyn, 2015) and describes leaders who can “motivate followers to achieve performance beyond expectations by transforming followers’ attitudes, beliefs, and values as opposed to simply gaining compliance” (Rafferty & Griffin, 2004 p. 330). Thus, TL describes leaders’ ability to inspire employees to work for them rather than, for example, simply using reward and punishment for performance (Bass, 1985, i.e., transactional leadership).

Specifically, TL comprises five dimensions (Rafferty & Griffin, 2004). *Vision* describes a leaders’ conception of an idealized organizational future. The second dimension *inspirational communication* accounts for this vision being conveyed to the leaders’ employees in a way that motivates the employees to work towards achieving this vision. *Supportive leadership* describes a transformational leader’s quality to consider his/her employees needs and concerns individually to create a safe working environment. Moreover, TL is defined by *intellectual stimulation* which describes the ability to challenge employees’ views and encourage them to tackle problems in entrepreneurial ways. Hence, it is about motivating employees to exceed their own performance expectations. Lastly, TL comprises *personal recognition* which describes leaders’ ability to give praise where it is due. In a nutshell, transformational leaders are able to motivate their employees to work towards an organisational goal or vision by being supportive on the one hand and challenging on the other.

In light of the training and recruitment of transformational leaders, recently thinking styles have gained more attention in the leadership literature (Cerni, Curtis, & Colmar, 2008, 2014; Curtis, 2020; Curtis, King & Russ, 2017; Curtis & Wee, 2021). They describe individual preferences regarding how to interpret information from the environment and interact with it accordingly (Epstein, 2014; Norris & Epstein, 2011; McGuinness, Zajac, Wilson, & Turnbull, 2019). More specifically, Epstein (2014) explains that there are rational- and experiential thinking styles. The *rational thinking style*, or rationality, describes the preference to employ logic for decision-making and positively relates to intellectual performance. Since the rational style is deliberate, processing is comparably slow and requires cognitive effort. The *experiential thinking style* describes the more or less unconscious process of relying on previous experiences and knowledge learned through associative learning, such as classical conditioning¹ when interacting with the environment. Therefore, it is effortless and fast.

¹ See Gleitmann, Gross, and Reisberg (2011) Chapter 7, for a definition of this concept.

In the course of Epstein developing the thinking style model, it was discovered that the experiential thinking style comprises three different styles (Norris & Epstein, 2011). *Emotionality* describes the tendency that primary emotions influence the way to act. For example, when being happy, humans are more willing to take risks (Epstein, 2014). *Imagination* refers to someone's tendency to think visually and relates to creativity. Lastly, *intuition*, which is more of a fuzzy concept (Epstein, 2010, 2014), can be explained as the tendency to let previously acquired knowledge and experiences influence deliberate thoughts or actions, also referred to as "gut-feeling" (Epstein, Pacini, Denes-Raj, & Heier, 1996, McGuinness et al., 2019). Hence, the experiential thinking style in fact comprises three thinking styles.

All in all, it is noteworthy that all thinking styles can be used in parallel. A person can be high or low on rational and experiential thinking styles or use one of the thinking styles more frequently than the other. Hence, individuals show trait-like differences regarding the thinking styles they prefer.

Returning to TL, the cognitive experiential leadership model (CELM, Cerni et al., 2014) was developed as a theoretical framework to explain how the different thinking styles relate to different leadership styles (i.e. laissez-faire, transactional and transformational). With the aim to test the CELM, several studies investigated the proposed relationships between thinking styles and leadership, specifically TL (Cerni et al., 2008; Curtis, 2020; Curtis et al., 2017; Curtis & Wee, 2021). However, the findings were mixed. Some thinking styles are significantly and positively related with TL and others not (Cerni et al., 2008; Curtis, 2020; Curtis et al., 2017; Curtis & Wee, 2021).

Since there is no clear evidence supporting the CELM, this study aims to reduce this knowledge gap by deepening the understanding of the relationship between thinking styles and TL. Ideally, future studies may then use the CELM as robust framework to develop TL trainings and create recruitment strategies to find transformational leaders. Hence, this study investigates the relationship between thinking styles and TL.

Keeping in mind that the evidence for the relationship between TL and thinking styles is mixed, it is straightforward though with regards to rationality and TL. The CELM highlights that intelligence is often used to measure the degree of rationality and is also strongly associated with the general ability to lead (Cerni et al., 2014). Moreover, both TL and rationality involve intellectual stimulation (Cerni et al., 2014; Epstein, 2014; Rafferty, & Griffin, 2004) pointing towards a positive association between the two variables. Indeed, several studies found significant and positive relationships between rationality and

transformational leaders (Cerni et al., 2008; Curits, 2020; Curtis et al., 2017; Curtis & Wee, 2021) supporting the theoretical argument. Therefore, the first hypothesis is concerned with replicating this finding.

H1: There is a positive relationship between rationality and TL.

Regarding imagination and TL, theory and evidence are in line, too. The ability to form and present a vision of an idealized future is an essential part of TL (Rafferty & Griffin, 2004), which is what imagination comprises, too; namely, the ability to rely on visual cues when interacting with the environment (Norris & Epstein, 2011). For this proposed relationship several studies found significant and positive evidence (Curtis, 2020; Curtis et al., 2017; Curtis & Wee, 2021). Therefore, the second hypothesis is concerned with replicating previous findings.

H2: There is a positive relationship between imagination and TL.

From a theoretical perspective, the relationship between intuition and TL is somewhat less straightforward. Maybe due to the vagueness of the concept *intuition*, the CELM does not give any explanations for why intuition may be related to TL (Cerni et al., 2014). Interestingly however, Curtis (2020) found a significant and strong positive relation between intuition and TL when it was rated by the employees of a leader, instead of the self-perception of a leader. Other studies found significant but weak positive relations, too (Cerni et al., 2008; Curtis et al., 2017). Although these studies did not devote much attention to this finding, there is a way to explain this.

The positive relation between intuition and TL can be explained by looking at interpersonal relationships: Before Norris and Epstein (2011) identified the three facets of experiential thinking styles, the measurement of experientiality was limited to items on intuition (Epstein et al., 1996). Here, they reported a significant and positive relationship between an intuitive-experiential thinking style and secure interpersonal relationships, indicating that people high on intuition are more likely to form close emotional attachments. In TL, too, good interpersonal relationships are relevant. Transformational leaders are supposed to show personal recognition and support, inspire their employees to follow and to strive for their vision, which all requires to have good interpersonal relationships with the employees (Rafferty & Griffin, 2004). Hence, a positive association between TL and intuition can be expected.

H3: There is a positive relationship between intuition and TL.

The theoretical explanation for the relationship between emotionality and TL points towards a positive association, too. Inspirational communication, as part of TL, is about sending “emotion-laden statements to arouse followers’ emotions” (Rafferty & Griffin, 2004, p. 332), highlighting that transformational leaders need emotions to engage people in meaningful ways. Epstein (2014) also explains that individuals’ preference for interacting with their environment is enabled and influenced by emotions. Hence, a positive association between emotionality and TL can be expected (Cerni et al., 2014).

Nevertheless, studies analyzing the relationship between TL and emotionality show mixed results. Curtis and Wee (2021) found a significant, yet weak positive relationship between emotionality and TL, whereas other studies could not find any relationship between emotionality and TL (Curtis, 2020; Curtis et al., 2017). The contradicting results may be explained by the presence of a moderator (Curtis et al., 2017; Curtis & Wee, 2021). When defining TL, merely the positive interaction between leaders and their employees is considered and not the expression of negative emotions (Rafferty & Griffin, 2004). However, emotionality captures both the expression of positive and negative emotion and also the strength and duration of emotions (Mc Guinness et al., 2019; Norris & Epstein, 2011). Hence, the way emotionality has been conceptualized is not in line with TL being restricted to the use of positive emotion, which suggests that there is no direct relation between emotionality and TL. However, the relation may be moderated by the expression of positive emotions (EPE), which can be defined as a person’s stable tendency to display positive, emotional behaviour in a situation (Gross & John, 1995). This results in the following hypothesis:

H4: Only for individuals with high EPE, there is a positive relationship between emotionality and TL.

To study the research question, a survey was sent to employees with leadership responsibilities. The survey comprised questions on demographic information, TL, thinking styles and the EPE. The research model is illustrated in figure 1 to give a complete overview.

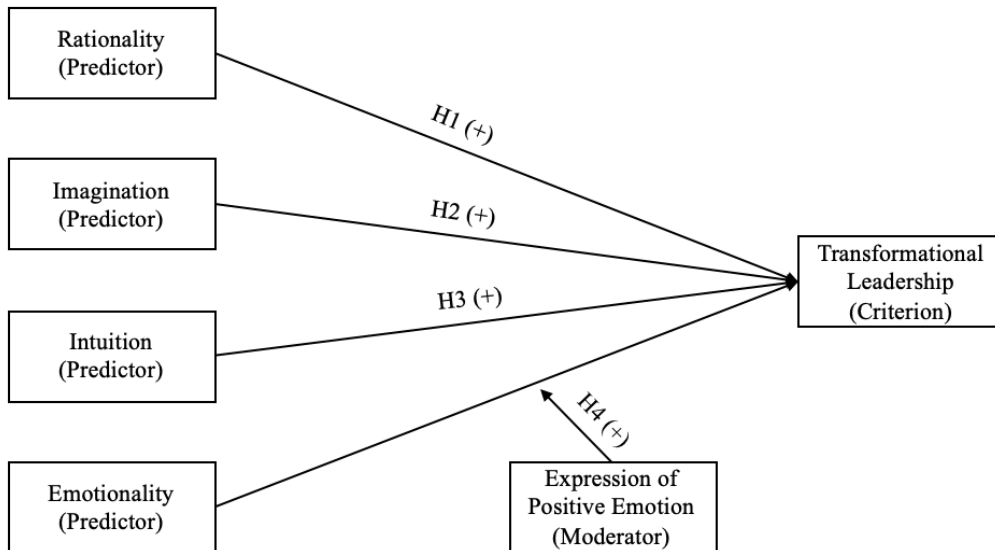


Figure 1. Research model on the predictors of transformational leadership.

Method

Participants

The sample was obtained through the social network of the researcher and of an executive search company. In total, 126 of the people contacted opened the link to the survey. However, 22 had to be excluded because they did not complete the survey, one respondent was excluded because the person did not consent and eight did not have any leadership responsibility. The final sample included 95 participants. The sample consisted of 75.8 % men, 23.2 % women and one person who did not indicate gender (1.1%). Most participants are between 36 and 55 years old (60%). Furthermore, 45.3% of the participants are in a high leading position (i.e. board of directors). The respondents work in a variety of sectors with the most working in the financial/service sectors (14.8%), marketing/media sectors (13.7%) and IT-sector (11.6%). A complete overview of the demographic information can be found in Appendix A.

Materials

To compare the current sample with those of previous research on thinking styles and TL, questions about gender, age, work sector and level of leadership responsibility were asked.

The TL measurement consists of 15 items that are equally distributed on the five subdimensions (vision, inspirational communication, intellectual stimulation, supportive leadership and personal recognition; Rafferty & Griffin, 2004, $\alpha = .82 - .96$). One item is reversed. The items are adapted to assess leaders' self-perception regarding their leadership

style instead of employees' perceptions by changing the third person pronouns "he/she" to the first-person pronoun "I" and by exchanging "my" with "my subordinate(s)". An example item would be to "[I] ha[ve] a clear understanding of where we are going". In the current sample Cronbach's alpha resulted in a value of .82.

It is noteworthy that Rafferty and Griffin (2004) propose to assess all dimensions of the TL scale individually. However, in this study, the scores on the dimensions are summarized to a total score in order to compare the TL results of the current study to the ones of previous studies.

To measure thinking styles, the short version of the Rational-Experiential Multimodal Inventory (REIm-13, McGuiness et al., 2019) was used. The questionnaire consists of four items measuring rationality and three items for each experiential thinking style, making a total of 13 items (McGuiness et al., 2019, $\alpha = .52 - .68$). An example item is: "I enjoy intellectual challenges". Four items are reversed. In this sample, the attained alphas ranged from .61 to .72. Considering the small number of items measuring the thinking style dimensions, the alphas are acceptable (Cortina, 1993).

The EPE was measured with the Positive Expressivity Facet scale of the Berkeley Expressivity Questionnaire (Gross & John, 1995, $\alpha = .65-.71$). An example item of the four items is "When I'm happy, my feelings show." Here, the Cronbach's alpha was .64, which is acceptable considering the small number of items (Cortina, 1993).

The answer options on all scales are in a 5-point Likert format. The answer options range from 1= *strongly disagree* to 5= *strongly agree* for the TL and positive expressivity questionnaire and from 1 = *completely false* to 5 = *completely true* for the thinking style questionnaire. All items were back and forth translated to German.

Procedure

The potential participants were forwarded to the online questionnaire on Qualtrics (www.qualtrics.com). Here, they were informed about the purpose of the study (Appendix B) and if they agreed to participate, they answered demographic questions (Appendix C). Then they answered the TL, thinking styles, and EPE questions (Appendix D). At the end of the survey, the participants were able to sign up for a report on the general findings of this study.

Data Analysis

The obtained data was transferred to SPSS (Version 28) and the final dataset contained demographic information, variables regarding TL, thinking styles and the EPE. Participants with missing data on the TL-, thinking style- and EPE variable were listwise deleted. The work sector categories marketing and media were put together since several respondents

answered to work in both sectors. The other participants who selected to work in more than one sector were assigned a missing value in the frequency analysis of the work-sectors and those who selected more than one option but also included an open response to specify their work sector were included in the category “other”. The first item of the TL-scale was falsely coded from 11 to 15 instead of 1 to 5. Therefore, this item was recoded accordingly. The reversed items were recoded, too and for each participant the total and mean score of TL, thinking styles and positive expressivity was calculated. The emotionality total score and the positive expressivity total score were mean-centred. Apart from demographic variables, all other variables were between-subject factors and quantitative.

Since all scales were translated to German and the TL-scale was adapted to reflect leader’s self-perception, factor analyses were performed to see whether the internal structure and dimensionality of the scales remained the same. Additionally, this was done to see whether the model for testing the hypotheses could be retained for analyses.

The assumptions of normality, homoscedasticity, linearity and multicollinearity had been met such that a hierarchical multiple regression analysis could be performed. It is noteworthy that the demographic information was not included as potential confounding variables in the regression analysis because of the low participant number. Therefore, analysis contained two blocks. The first block contained the TL total score as dependent variable and the total scores of rationality, imagination, and intuition and the mean centred total scores of emotionality and EPE as predictors. For the second block, the interaction term of EPE and emotionality was calculated (Baron & Kenny, 1986) and added. If the interaction beta is significant, the strength of the effect will be analyzed with a simple slope analysis using Hayes’ Process macro for SPSS (Hayes, 2013). It is noteworthy that the hierarchical regression model is run in SPSS since it easily produces the required output to check the assumptions and the potential moderation effect is better investigated with Hayes’ Process Macro.

Results

Descriptive Statistics

The descriptive statistics of the sample are depicted in table 1. Participants scored on average between three and four on all scales, except for the TL-scale where participants scored between four and five on average. All thinking styles and EPE correlate significantly with TL. Intuition correlates significantly with rationality but does not significantly correlate with emotionality. The correlation is however almost significant.

Table 1

Mean (*M*), Standard Deviations (*SD*), percentage (%), and Correlations for all variables involved in analysis (*N* = 95).

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6
1. TL	4.28	0.37	1					
2. rationality	4.08	0.69	.30**	1				
3. imagination	4.10	0.76	.34**	.14	1			
4. intuition	3.61	0.65	.26*	.22*	.21*	1		
5. emotionality	3.83	0.68	.21*	.09	.29**	.19	1	
6. positive expressivity	3.84	0.56	.34**	.12	.43**	.20	.55*	1

Note. All variables were measured on a 5.-Likert Scale.

* $p < .05$. ** $p < .01$

Factor analysis

A factor analysis using maximum likelihood extraction and promax rotation was performed for the TL-, the thinking style- and the EPE scale (see Appendix D for the pattern matrices). All KMO tests had a value of $>.58$ and the Barlett's tests of sphericity were significant, allowing to proceed with the factor analyses. Within factor analysis, all scales produced the same number of factors as the original scales proposed (Eigenvalues > 1), and the RMSEAs lie between .002 and .005. All items loaded $>.38$ on the according factors and all $<.24$ on the other factors, except for one TL- and one thinking style item. The item "I encourage people to see changing environments as situations full of opportunities" loaded with .25 on the according factor *inspirational communication* and .38 on a second factor *intellectual stimulation*. The reversed coded item "Emotions don't really mean much: they come and go" loaded with .31 on the emotionality factor. Since the same factors were

produced with the factor analyses, the hierarchical multiple regression analysis was performed as planned.

Main analysis

The hierarchical multiple regression analysis was performed with two models (see Appendix E for complete table). The first model contained all predictors and revealed a significant regression equation with an explained variance of 23.8% ($R^2 = .24$, $F(5, 89) = 5.55$, $p < .001$). The interaction term added in the second model resulted in a significant increase of 3.9% variance explained ($\Delta R^2 = .04$, $\Delta F(6, 88) = 4.74$, $p = .032$).

More specifically, model one showed that rationality has a significant and positive relation with TL ($\beta = .22$, $t(89) = 2.34$, $p = .021$). Therefore, H1 is retained. Imagination and intuition have no significant relation with TL ($\beta = .19$, $t(89) = 1.83$, $p = .071$; $\beta = .13$, $t(89) = 1.32$, $p = .19$; respectively). Hence, H2 and H3 which indicate a positive relationship between imagination and TL as well as between intuition and TL are not supported. There is also no significant relation between emotionality as well as EPE with TL ($\beta = -.00$, $t(89) = -.02$, $p = .99$; $\beta = .21$, $t(89) = 1.76$, $p = .08$; respectively). Model two revealed that the interaction between emotionality and the EPE has a significant effect on TL ($\beta = .21$, $t(88) = 2.18$, $p = .03$), confirming H4.

Since the interaction beta was significant, a simple slope analysis was conducted with the conditional effects of the predictor (see Figure 2). For high EPE, the relationship between emotionality and TL was significant and positive ($\beta = .97$, $t(91) = 2.33$, $p = .02$), whereas the relationship was not significant for average and low EPE ($\beta = .17$, $t(91) = .57$, $p = .57$; $\beta = -.62$, $t(91) = -1.62$, $p = .11$, respectively). The results show that high EPE strengthens the relationship between emotionality and TL.

An exploratory linear regression analysis was conducted in which thinking styles were regressed on the TL dimension vision. For this, the total score of the dimension vision was calculated. The analysis showed that imagination is positively related to vision and is close to significant ($\beta = .2$, $t(90) = 1.9$, $p = .058$). Intuition and emotionality are not significantly related to vision ($\beta = .03$, $t(90) = .28$, $p = .78$; $\beta = .1$, $t(90) = .94$, $p = .35$; respectively). Rationality is significantly and positively related to vision ($\beta = .26$, $t(90) = 2.65$, $p = .01$).

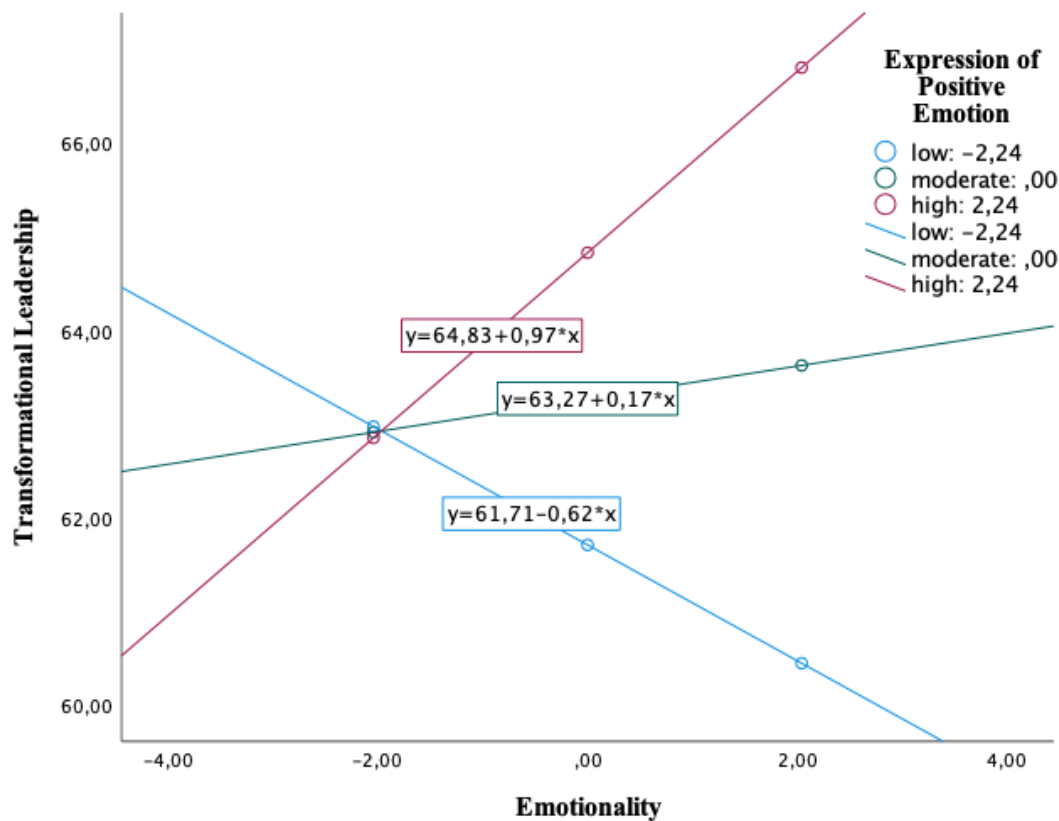


Figure 2. Mean regression slopes for high-, moderate- and low expression of positive emotions on the relationship between emotionality and transformational leadership.

It is noteworthy that this study could have detected an effect size of $f^2 = .08$ ($1 - \beta = .80$, $\alpha = 0.05$, $N = 95$) calculated with G*Power (Faul, Erdfelder, Lang, & Buchner, 2007). Therefore, the analysis is sensitive to small to medium effects according to Cohen (1988, as cited in Faul et al., 2007)

Discussion

This study aimed to gain a deeper understanding of the relationship between thinking styles and TL and whether EPE has a moderating effect on the relationship between emotionality and TL. The results indicate that there is a significant and positive relationship between rationality and TL but that there are no significant relationships between the experiential thinking styles and TL. A significant and positive effect of high EPE on the relationship between emotionality and TL was found, indicating that EPE is a moderator.

Main findings & their theoretical implications

The first hypothesis regarding the positive relationship between rationality and TL was confirmed. The results show that transformational leaders rely on rationality when making decisions and interacting with their environment. From a theoretical perspective, this relation

makes sense, since both rationality and general leadership ability are related to intelligence (Cerni et al., 2014). Previous studies found similar results (Cerni et al., 2008; Curits, 2020; Curtis et al., 2017; Curtis & Wee, 2021), indicating that the relationship between rationality and TL is robust.

Nevertheless, it has to be considered whether the findings are due to a HALO effect. Respondents can have implicit ideas about what “good” versus “bad” leadership entails (Shondrick, Dinh, & Lord, 2010). Curtis (2020) explains that leaders may believe that “good” leaders think rationally. This implicit theory can influence leaders in a way that they answer in line with their idealised view on leadership rather than accurately reporting their level of rationality. Hence, the found relation between rationality and TL could also be illusory.

Contrary to robust findings of previous studies (Curtis, 2020; Curtis et al., 2017; Curtis & Wee, 2021), the hypothesis regarding the positive relationship between imagination and TL was rejected. This finding is also in contrast to the CELM (Cerni et al., 2014), which highlights that transformational leaders need the ability to create a vision of their organisation’s future, which is reflected by the experiential thinking style *imagination*. Therefore, the question needs to be asked why this study could not replicate this relationship.

One possible answer is connected to gender. When comparing the current sample to the ones from Curtis and colleagues (2017) with similar sample sizes ($n = 70$ & $n = 93$), the main difference is the gender distribution. Here, about a quarter are female (23.2%) whereas their samples consisted of around 50% women (Curtis et al., 2017). Studies investigating the distribution of thinking styles according to gender found that experiential thinking styles are significantly more represented in females than males (McGuinness et al., 2019; Norris & Epstein, 2011). Hence, it may be that gender moderates the relationship between experiential thinking styles and TL and that only for women there is a positive relationship between experiential thinking styles and TL. Thus, because of the larger representation of men in this sample it is possible that no direct effect between imagination and TL was found but that previous studies with more women in their samples did find an effect.

An alternative explanation for why no relation between imagination and TL was found is that imagination is only related to one dimension of TL rather than the overall leadership style. Therefore, one should look at the relation between imagination and the TL dimension vision. As stated before, imagination is especially relevant for a leader to form a vision of their organization’s future, whereas the other thinking styles are not relevant for forming a vision. This becomes clear when looking at the definition of the TL dimension. Here, it states that vision is the “expression of an idealized picture of the future based around organizational

values” (Rafferty & Griffin, 2004, p 331). Thus, the authors make clear that leaders form a “picture” of the future which is reflected by the thinking style item “I enjoy imagining things” on the imagination subscale (McGuinness et al., 2019). In comparison, the other thinking styles (i.e. rationality, intuition, & emotionality) do not seem to be at play when leaders form a vision. Therefore, it can be hypothesized that only imagination is positively related to vision. In order to gain some initial insight for whether the proposed relationship between imagination and vision holds, the exploratory linear regression analysis was conducted. The findings suggest that intuition and emotionality are not significantly related to TL. However, in addition to rationality, imagination is close to significant when explaining vision. Hence, there is initial evidence for an alternative explanation of the relation between imagination and TL, namely that imagination relates to the TL dimension vision.

Although not directly related to the hypothesized relation between imagination and vision, a short paragraph has to be devoted to exploring the relation between rationality and vision. In the definition of vision, it is highlighted that a vision is formed “around organizational values” (Rafferty & Griffin, 2004, p. 331). Incorporating the values of an organization into visualizing a future may in fact require additional cognitive effort, which goes beyond the ability to imagine a future. Hence, forming a vision may also depend on rationality which allows transformational leaders to incorporate the organizational values into their vision.

The relationship between intuition and TL was not confirmed (H3) either. It was hypothesized that because both intuition and TL relate to interpersonal relationships (Epstein et al., 1996; Sunindijo & Zou, 2013), they have a positive relationship, too. This finding is in contrast to previous studies (Cerni et al., 2008 Curtis et al., 2017) which found significant and positive albeit weak relations between intuition and TL. Taking previous results and the current findings together, they do not give a clear picture on the relationship between intuition and TL. Alternative explanations need to be considered. One possibility is that there truly is no relationship between intuition and TL, which would be in line with the CELM (Cerni et al., 2014).

Alternatively, it may be that the relationship between intuition and TL is moderated by interpersonal skills and that intuition, like imagination, only relates to specific TL dimensions. Intuition correlates with the ability to form interpersonal attachments (Epstein et al., 1996) and TL has been shown to be predicted by interpersonal skills (Sunindijo & Zou, 2013). Specifically, the TL dimension individualized consideration (Cerni et al., 2008) is hypothesized to be related to forming interpersonal relationships. Individualized consideration

is a TL dimension taken from the Multifactor Leadership Questionnaire (Bass, 1985) and is similar to the TL dimension supportive leadership of the model by Rafferty and Griffin (2004). From a theoretical perspective it makes sense, that leaders who “express(...) concern for followers and tak[e] account of their individual needs” (Rafferty & Griffin, 2004, p. 333) need some degree of interpersonal skills to connect with their employees in order to support them. Hence, interpersonal skills may be moderating the relationship between intuition and the TL dimension supportive leadership.

Lastly, it was hypothesized that only for individuals with high EPE there is a relationship between emotionality and TL (H4). The hierarchical regression analysis showed that there is no significant relation between emotionality and TL and simple slopes analysis indicated that only for people with high EPE, there is a relationship between emotionality and TL. Hence, the hypothesis was confirmed. This result is interesting since the EPE has not been investigated as moderator between emotionality and TL before. The significant moderation effect found, contributes to existing literature since it can explain why some studies could and others could not find a direct relationship between emotionality and TL (Curtis, 2020; Curtis et al., 2017; Curtis & Wee, 2021). The argument of the CELM that emotionality is related to TL (Cerni et al., 2014) can be strengthened with the current findings.

Nevertheless, similar to considering gender as moderator between imagination and TL, it has to be considered that gender moderates the direct relationship between emotionality and TL, too. Emotionality, just like imagination, is an experiential thinking style which is significantly more represented amongst women (McGuinness et al., 2019; Norris & Epstein, 2011). Hence, the nonsignificant relationship between emotionality and TL may be due to the fact that gender was not included as a moderator. Therefore, the analysis may not have been sensitive to the underrepresentation of women in the current sample.

The factor analysis of the TL scale revealed that the item “I encourage people to see changing environments full of opportunities” of the inspirational communication factor loaded higher on intellectual stimulation. In the study on the scale such a finding was not reported (Rafferty & Griffin, 2004). Possibly, the back and forth translation did not adequately capture the meaning of the original item in the German version “Ich ermutige Menschen, Veränderungen im Umfeld als Chancen zu begreifen”. Indeed, here it was decided to not use a literal translation (i.e. “Ich ermutige Menschen, die sich verändernden Umgebungen als voll von Möglichkeiten zu sehen”) since it was a more complex grammatical structure and depicted an unusual way of speaking. The translation used would literally

translate into “I encourage people to see changes in the environment as opportunities” which is somewhat different to the original item. Thus, the translation may not be adequate.

An alternative explanation for the weak loading of the TL item on its’ ascribed factor is that the item should actually be ascribed to the intellectual stimulation factor. On the one hand, the item fits the description of inspirational communication as it describes the potential to motivate employees to see a situation as more positive (i.e. “full of opportunities”). On the other hand, the sentence is also suitable to represent intellectual stimulation because it describes the degree to which a leader can challenge employees to take a different perspective on existing situations (i.e. “see changing environment full of opportunities”; Rafferty & Griffin, 2004). Thus, the inspirational communication item in question may need to be re-assigned to the intellectual stimulation dimension.

Limitations and future research

Some limitations and overall considerations need to be discussed. The sample was attained by convenience sampling via the social network of the researcher and of the executive search company. This may explain why the demographics of the participants are not diverse regarding gender. Hence, the results are difficult to generalize across populations (Landers & Behrend, 2015). Moreover, gender was not included as moderator for the relations between experiential thinking styles and TL, which should be considered in the future.

Furthermore, the ability to compare the current findings to previous ones is limited, due to the use of different scales. A shortened version of the thinking style measurement (McGuinness et al., 2019) and a different TL scale, measuring a slightly different TL construct (Rafferty & Griffin, 2004) have been used. It is noteworthy that previous studies investigating the relationship between thinking styles and TL relied on the definition by Bass (1985) and the associated Multifactor Leadership Questionnaire (MLQ) to measure TL. However, several concerns about the MLQ’s psychometric properties, like its factor structure have been voiced (Tejeda, Scandura, & Pillai, 2001). Therefore, the definition and scale by Rafferty and Griffin (2004), which has better construct validity, has been used in the current study. Hence, future studies should also rely on the TL definition and scale by Rafferty and Griffin (2004).

Future research in German-speaking environments need to consider the translations of the questionnaires again. The current translation of one of the TL items indicates that either the translation did not adequately capture the meaning or that the item needs to be moved to another TL dimension. In general, future studies should confirm that the existing translations of all questionnaires are adequately reflecting the original scales.

A general point of advice for future research on the relationship between thinking styles and TL is to gain deeper understanding of the specific relations between the individual thinking styles and the dimensions of TL. This would also be more in line with the conceptualization of TL according to Rafferty and Griffin (2004), who recommend looking at the individual dimensions of TL rather than a higher order factor. As demonstrated for the TL dimension *vision* and *supportive leadership*, there are theoretical arguments to look at this level of TL instead of the overall factor. Moreover, the exploratory regression analysis points towards a relation between imagination as well as rationality with vision that needs further investigation.

Moreover, it is necessary for future studies to replicate the finding regarding the moderation effect of EPE. This is important to gain confidence that this was not an incidental finding. A limitation of the current study is that it did not investigate the expression of negative emotionality. Future studies should investigate whether the expression of negative emotion is behaving opposite to the EPE ones. Namely, that the expression of negative emotion weakens the relationship between emotionality and TL. Understanding the influence of the expression of negative emotion on the relationship between emotionality and TL can strengthen the argument that transformational leaders are solely reliant on the EPE.

Practical implications

Several conclusions can be drawn that are useful for organizations that want to counteract the “war for talents” in terms of recruitment and training of transformational leaders. The study investigated how transformational leaders think and which thinking styles are important for TL. More specifically, this study verified that the ability to think rationally relates to TL and that for leaders with high EPE, the ability to use the emotionality thinking style is related to TL.

Based on this knowledge, recruiters can incorporate an assessment of rationality, emotionality and EPE in their selection of transformational leaders. Objective assessments are successful tools to evaluate candidates (Cascio & Aguinis, 2014, chapter 12). When selecting transformational leaders, recruiters can therefore use items from this study to objectively assess the degree to which candidates think rationally, emotionally, express positive emotion and to what degree they have TL skills. Hence, this assessment helps recruiters understand the thinking styles of their candidates and helps them decide which candidate is (likely to be) a transformational leader. Nevertheless, recruiters should keep in mind that candidates often answer socially desirable (Preiss, Mejzlíková, Rudá, Krámský, & Pitáková). Thus, candidates

may overestimate their use of rationality and the degree of expressing positive emotion if they think they can increase their likelihood to get the job by doing so.

A second practical contribution can be made in terms of TL trainings. An experimental study revealed that TL skills can be increased by, for example, training leaders' use of rationality (Cerni, Curits, & Colmar, 2010). The training consisted of individual coaching sessions in which leaders learned to identify their thinking style preferences in sample scenarios. On that basis, they set individual goals to increase their use of rationality. In the future, this training model can be expanded by including the possibility for leaders to learn how to express more positive emotions to increase their TL skillset.

Conclusion

The aim of this study was to gain a deeper understanding of the relationship between thinking styles and TL. Specifically, more evidence was gathered in favour of the relationship between rationality and TL. New insights with regards to the relationship between emotionality and TL were found by including the moderator EPE for the first time. Although no significant relations between the experiential thinking styles and TL were found, several new ways of researching the relationships between thinking styles and TL could be recommended.

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Appendix A:

Complete demographic information of the sample

Table A1

Percentage of participants indicating their gender (N = 95)

Which gender do you feel belonging to?				
Answer Options	Man	Woman	Nonbinary / third gender	I'd rather not say
Response rate	75.8	23.2	0	1.1

Note. Response rate in percent (%).

Table A2

Percentage of participants indicating their age (N = 95)

	How old are you?					
Age in years	18-25	26-35	36-45	46-55	56-56	> 65
Response rate	1.1	8.4	25.3	34.7	26.3	4.2

Note. Response rate in percent (%).

Table A3

Percentage of participants indicating their work sector (N = 90)

	In which sector do you work?								
Work sector	Construction and housing	Financial and business services	Other services	Trade and catering	IT sector	Industry	Agriculture and environment	Education	Government and politics
Response rate	4.4	10.0	5.6	7.8	12.2	6.7	0.0	2.2	2.2

Note. Response rate in percent (%).

Marketing / PR / advertising & media	Security and justice	Transport	Leisure and culture	Science, research	Healthcare	Other, namely
14.5	0.0	3.3	0	1.1	8.9	21.1

Table A4

Percentage of participants indicating their level of leadership responsibility (N = 95)

How much leadership responsibility do you have?			
Level of responsibility	Lower management	Middle management	Upper management
Response rate	21.1	33.7	45.3

Note. Response rate in percent (%).

Appendix B:

Information letter and informed consent in German, followed by the English translation

Liebe*r Teilnehmer*in

vielen Dank für Ihr Interesse an dieser Studie. Ich bin Lea Ellerich und im Rahmen meine Master-These an der Radboud Universität (NL) möchte ich mehr über Denkstile, transformationelle Führung und positive Emotionalität erfahren. Bevor Sie sich zur Teilnahme entschließen, nehmen Sie sich bitte etwas Zeit, um die folgenden Informationen zu lesen.

Nachfolgend finden Sie eine stichpunktartige Zusammenfassung aller wichtigen Informationen zu Ihrer Teilnahme. Diese sind weiter unten nochmals detaillierter aufgeführt. Die Informationen im Überblick:

- Alle Informationen werden anonym gesammelt. Ihre Antworten können nicht auf Sie zurückgeführt werden.
- Ihre Teilnahme an dieser Studie ist komplett freiwillig.
- Es werden folgende persönliche Angaben abgefragt: Geschlecht, Alter, Branche und Führungsverantwortung. Diese Informationen können nicht genutzt werden, um Antworten einer bestimmten Person zuzuschreiben.
- Das Ausfüllen der Umfrage nimmt ungefähr 10 Minuten in Anspruch.
- Während der Studie können Sie jederzeit angeben, dass Sie die Teilnahme beenden möchten, ohne einen Grund dafür angeben zu müssen. Das Abbrechen der Studie hat keinerlei Konsequenzen für Sie.
- Auf der nächsten Seite werden Sie um Ihre Einwilligung zur Teilnahme an der Studie gebeten. Danach beginnt die Umfrage, die aus insgesamt 39 Fragen besteht.
- Sobald Sie Ihre Einwilligung erteilt und die Umfrage abgeschlossen haben, können Sie Ihre Einwilligung nicht mehr widerrufen und Ihre Daten können nicht gelöscht werden.
- Wenn Sie Fragen, Anmerkungen oder Bedenken zu dieser Studie haben, wenden Sie sich bitte an die verantwortliche Forscherin (Lea Ellerich, lea.ellerich@ru.nl) oder den Betreuer dieser Forschung (Wolter Pieters, Behavioural Science Institute der Radboud University Nijmegen, wolter.pieters@ru.nl).
- Sie können nun an das Ende dieser Seite scrollen und unten rechts auf den Pfeil klicken, um zu der Einverständniserklärung zu kommen. Sollten Sie nähere Informationen zu der Studie wünschen, finden Sie folgend die bereits genannten

Informationen im Detail beschrieben.

Die Informationen im Detail:

INFORMATIONSBRIEF

für die Teilnahme an der wissenschaftlichen Studie: transformationeller Führungsstil und Denkstile

In dieser Studie geht es um transformationellen Führungsstil –und inwieweit dieser mit unterschiedlichen Denkstilen korreliert. Zudem möchte ich mit dieser Umfrage herausfinden, in wie weit der Ausdruck von positiven Emotionen eine Rolle spielt. Um Ihnen einen Überblick darüber zu geben, was Sie von dieser Umfrage erwarten können, werde ich den Ablauf kurz erklären.

Im Folgenden werden Sie um Ihre Zustimmung zur Teilnahme an dieser Studie gebeten. Sie können sich so viel Zeit nehmen, wie Sie möchten, um zu entscheiden, ob Sie teilnehmen möchten. Ihre Teilnahme sollte völlig freiwillig sein. Die von Ihnen unterzeichnete Einverständniserklärung wird nach Abschluss der Untersuchung 10 Jahre lang aufbewahrt. Alle im Rahmen dieser Studie gesammelten Informationen werden in Übereinstimmung mit den Richtlinien der ‚General Data Protection Regulation‘ (GDPR) anonymisiert erhoben. Ihre anonymisierten Forschungsdaten werden mit äußerster Sorgfalt behandelt, sind nur für autorisiertes Personal zugänglich und werden nach Abschluss der Studie 10 Jahre lang auf gesicherten Geräten aufbewahrt. Keine der Informationen, die Sie in dieser Studie zur Verfügung stellen, kann zu Ihnen zurückverfolgt werden. Dies hat zur Folge, dass ich Sie nach Abschluss der Studie nicht über Ihre persönlichen Ergebnisse informieren kann. Wenn Sie jedoch über die Ergebnisse der gesamten Studie informiert werden möchten, kontaktieren Sie mich bitte über lea.ellerich@ru.nl. Die Umfrage entspricht den Richtlinien für ethische Forschung der Ethikkommission für Sozialwissenschaften (ECSS) der Radboud-Universität, und es gibt keine formellen Einwände gegen diese Studie.

Nachdem Sie Ihre Zustimmung gegeben haben, beginnt die Umfrage. Sie umfasst 39 Fragen. Alle Fragen können Sie beantworten, indem Sie die Antwortoptionen auswählen, die Sie Ihrer Meinung nach am besten beschreiben; Sie brauchen nichts zu schreiben. Die Studie ist in deutscher Sprache, und Sie werden etwa 10 Minuten brauchen, um den Fragebogen auszufüllen. Sie können die Teilnahme jederzeit beenden, ohne dies begründen zu müssen. Ein Abbruch während der Studie hat keinerlei Konsequenzen und die bis dahin erhobenen Daten werden gelöscht. Das Ausfüllen dieser Umfrage ist mit keinerlei Risiken verbunden. Die gewonnenen Forschungsdaten werden nicht aus medizinischer und/oder klinischer Perspektive betrachtet. Daher kann Ihre Teilnahme an der Studie nicht als

medizinischer/klinischer Test angesehen werden. Wenn Sie sich aufgrund der Fragen Sorgen um Ihre Gesundheit machen, empfehlen wir Ihnen, sich an Ihren Hausarzt zu wenden.

Zur Durchführung dieser Studie ist es notwendig, dass wir einige Ihrer persönlichen Daten erheben, verwenden und speichern. Dabei handelt es sich um folgende Daten: Geschlecht, Alter, Branche, in der Sie arbeiten, und ob Sie Führungsverantwortung haben. Wir nutzen und speichern diese personenbezogenen Daten, um mehr über die Verteilung der Variablen in Deutschland zu erfahren.

Die Informationen, die Sie für die aktuellen Forschungszwecke zur Verfügung stellen, werden mit äußerster Sorgfalt behandelt und sind nur autorisierten Mitarbeitern zugänglich.

Persönliche Daten, die der Forscher über Sie sammelt, werden während der gesamten Untersuchung vertraulich behandelt. Um Ihre Privatsphäre zu schützen, speichert der Forscher Ihre persönlichen Daten in anonymisierter Form. Das bedeutet, dass die Informationen nicht verwendet werden können, um die Antworten zu Ihnen zurückzuverfolgen. Um Ihre Identität zu verschleiern, dürfen nur anonymisierte Forschungsdaten in Berichten und Veröffentlichungen über die Forschung verwendet werden.

Aufgrund der Bedeutung der Kontrolle, Wiederverwendung und/oder Replikation von Forschungsergebnissen werden Forschungsdaten zunehmend mit anderen Forschern geteilt oder ihnen zur Verfügung gestellt. Da Ihre Daten jedoch anonymisiert sind, können Sie anhand dieser Daten nicht identifiziert werden. Wenn Sie nicht möchten, dass Ihre anonymisierten Daten weitergegeben werden, können Sie nicht an dieser Studie teilnehmen. Einige Personen und Organisationen müssen Zugang zu Ihren persönlichen und Forschungsdaten haben. Dies ist notwendig, um zu prüfen, ob die Forschung ordnungsgemäß und zuverlässig durchgeführt wurde. Zu diesen Personen und Aufsichtsbehörden, die Ihre Daten zur Überprüfung einsehen können, gehören: befugte Personen innerhalb des Behavioral Science Institute oder der Radboud Universität (z. B. ein Dekan, Direktor oder Datenbeauftragter) und (inter-)nationale Aufsichtsbehörden (z. B. die niederländische Datenschutzbehörde und das Netherlands Board on Research Integrity). Sie sind verpflichtet, Ihre Daten auf streng vertraulicher Basis zu prüfen. Sie werden um Ihre Zustimmung zu dieser Einsichtnahme gebeten. Wenn Sie dies verweigern, können Sie nicht an der Studie teilnehmen.

Die Radboud-Universität ist für die Einhaltung der Allgemeinen Datenschutzverordnung (GDPR) bei der Verarbeitung Ihrer persönlichen Daten verantwortlich. Der Forscher sorgt dafür, dass Ihre Privatsphäre und die damit verbundenen Bedingungen geschützt werden, und

er/sie hält sich bei der Durchführung dieser Forschung an den niederländischen Verhaltenskodex für wissenschaftliche Integrität und die Universitätspolitik in Bezug auf die Speicherung und Verwaltung von persönlichen und Forschungsdaten. Die Datenschutzerklärung der Radboud Universität finden Sie unter:

<https://www.ru.nl/english/vaste-onderdelen/privacy-statement-radboud-university/>. Wenn Sie Fragen zum Datenschutz haben, wenden Sie sich bitte an den Datenschutzbeauftragten der Fakultät für Sozialwissenschaften (P.Janssen@socsci.ru.nl). Bei allgemeinen Fragen wenden Sie sich bitte an das Büro des Datenschutzbeauftragten der Universität Radboud unter privacy@ru.nl. Weitere Informationen über Ihre Rechte bei der Verarbeitung Ihrer persönlichen Daten finden Sie unter <https://www.ru.nl/privacy/english/protection-personal-data/data-subjects-rights/> und auf der Website der niederländischen Datenschutzbehörde (<https://autoriteitpersoonsgegevens.nl/en>).

Ihre Teilnahme an dieser Studie ist völlig freiwillig. Wenn Sie sich entscheiden, nicht teilzunehmen, hat das keine Konsequenzen. Wenn Sie während des Ausfüllens der Umfrage Ihre Teilnahme beenden möchten, haben Sie jedes Recht dazu. Auch hier wird es keine nachteiligen Folgen für Sie geben. Die Daten werden jedoch anonym erhoben und können nicht mit Ihnen in Verbindung gebracht werden. Das heißt, sobald Sie Ihre Einwilligung erteilt haben und die Umfrage abgeschlossen haben, können Sie Ihre Einwilligung nicht mehr widerrufen und Ihre Daten können nicht gelöscht werden.

Wenn Sie Fragen, Anmerkungen oder Bedenken zu dieser Studie haben, wenden Sie sich bitte an die verantwortliche Forscherin (Lea Ellerich, lea.ellerich@ru.nl) oder den Betreuer dieser Forschung (Wolter Pieters, Behavioural Science Institute der Radboud University Nijmegen, wolter.pieters@ru.nl).

Mit freundlichen Grüßen,

Lea Ellerich

Lea.ellerich@ru.nl

Fakultät für Sozialwissenschaften,
Radboud Universität Nijmegen

Liebe*r Teilnehmer*in,

vielen Dank für Ihr Interesse an dieser Studie.

Bevor Sie sich zur Teilnahme entschließen, nehmen Sie sich bitte etwas Zeit, um die folgenden Informationen zu lesen und zu verstehen.

Ich bestätige hiermit, dass:

- ich schriftlich ausreichend über die Studie informiert worden bin
- ich die schriftlichen Informationen gelesen habe
- mir die Möglichkeit gegeben wurde, Fragen zur Studie zu stellen
- meine Fragen zufriedenstellend beantwortet worden sind
- ich ausreichend Gelegenheit erhalten habe, über meine Teilnahme an der Studie nachzudenken
- die Teilnahme an der Studie auf freiwilliger Basis erfolgt.

Ich habe verstanden, dass:

- ich die Umfrage jederzeit ohne Konsequenzen abbrechen kann
- diese Umfrage anonym ist
- die von mir gegebenen Antworten nicht zu mir zurückverfolgt werden können und die Daten nach Abschluss der Umfrage nicht gelöscht werden können
- meine persönlichen Daten in Übereinstimmung mit den geltenden europäischen Datenschutzbestimmungen und der Datenschutzerklärung der Radboud Universität (<https://www.ru.nl/english/vaste-onderdelen/privacy-statement-radboud-university/>) verarbeitet werden.

Ich stimme zu, dass:

- meine persönlichen Daten und Forschungsdaten im Rahmen dieser Untersuchung für wissenschaftliche Zwecke erhoben werden und 10 Jahre lang zur Überprüfung, Wiederverwendung und Replikation zur Verfügung stehen
- die unterzeichnete Einverständniserklärung mit meinen persönlichen Daten 10 Jahre lang aufbewahrt wird
- die Aufsichtsbehörden meine personenbezogenen Daten und Forschungsdaten zum Zweck der Überprüfung der Forschung einsehen können.

Dear Participant,

Thank you for your interest in this study. I am Lea Ellerich and as part of my Master's thesis at Radboud University (NL) I would like to learn more about thinking styles, transformational leadership and positive emotionality. Before you decide to participate, please take some time to read the following information.

Below is a bullet-point summary of all the important information about your participation.

These are listed again in more detail below.

The information at a glance:

- All information is collected anonymously. Your answers cannot be traced back to you.
- Your participation in this study is completely voluntary.
- The following personal information is requested: gender, age, industry and management responsibility. This information cannot be used to attribute responses to a specific individual.
- The survey takes approximately 10 minutes to complete.
- At any time during the study, you can indicate that you would like to stop participating without having to give a reason. There are no consequences for you for cancelling the study.
- On the next page, you will be asked for your consent to participate in the study. After that, the survey begins, which consists of a total of 39 questions.
- Once you have given your consent and completed the survey, you cannot withdraw your consent and your data cannot be deleted.
- If you have any questions, comments or concerns about this study, please contact the responsible researcher (Lea Ellerich, lea.ellerich@ru.nl) or the supervisor of this research (Wolter Pieters, Behavioural Science Institute of Radboud University Nijmegen, wolter.pieters@ru.nl).
- You can now scroll to the bottom of this page and click on the arrow at the bottom right to get to the consent form. If you would like more information about the study, you will find the information already mentioned in detail below.

The information in detail:

INFORMATION LETTER

for participation in the scientific study: transformational leadership and thinking styles

This study is about transformational leadership style - and to what extent it correlates with different thinking styles. In addition, I would like to use this survey to find out to what extent

the expression of positive emotions plays a role. To give you an overview of what you can expect from this survey, I will briefly explain the process.

In the following, you will be asked for your consent to participate in this study. You can take as much time as you like to decide whether you want to participate. Your participation should be completely voluntary. The consent form you sign will be kept for 10 years after the study is completed. All information collected as part of this study will be collected anonymously in accordance with the 'General Data Protection Regulation' (GDPR) guidelines. Your anonymised research data will be handled with the utmost care, will only be accessible to authorised personnel and will be kept on secure equipment for 10 years after the study is completed. None of the information you provide in this study can be traced back to you. As a result, I will not be able to inform you of your personal results after the study is completed. However, if you would like to be informed about the results of the whole study, please contact me via lea.ellerich@ru.nl. The survey complies with the ethical research guidelines of the Ethics Committee for Social Sciences (ECSS) of Radboud University and there are no formal objections to this study.

After you have given your consent, the survey will start. It consists of 39 questions. You can answer all the questions by choosing the answer options that you think best describe you; you do not need to write anything. The survey is in German and you will need about 10 minutes to complete the questionnaire. You can stop participating at any time without having to give reasons. Dropping out during the study has no consequences and the data collected up to that point will be deleted. There are no risks involved in completing this survey.

The research data obtained will not be considered from a medical and/or clinical perspective. Therefore, your participation in the study cannot be considered a medical/clinical test. If you are concerned about your health as a result of the questions, we recommend that you consult your GP.

In order to conduct this study, it is necessary for us to collect, use and store some of your personal data. This is the following data: Gender, age, industry you work in and whether you have managerial responsibilities. We use and store this personal data to learn more about the distribution of variables in Germany.

The information you provide for current research purposes is treated with the utmost care and is only accessible to authorised employees. Personal information that the researcher collects about you will be kept confidential throughout the research. To protect your privacy, the researcher stores your personal information in anonymised form. This means that the

information cannot be used to trace the answers back to you. To conceal your identity, only anonymised research data may be used in reports and publications about the research.

Due to the importance of controlling, reusing and/or replicating research results, research data is increasingly shared with or made available to other researchers. However, as your data is anonymised, you cannot be identified from it. If you do not want your anonymised data to be shared, you cannot participate in this study.

Some people and organisations need to have access to your personal and research data. This is necessary to check that the research has been conducted properly and reliably. These persons and supervisory authorities who can see your data for verification include: authorised persons within the Behavioral Science Institute or Radboud University (e.g. a dean, director or data officer) and (inter)national supervisory authorities (e.g. the Dutch Data Protection Authority and the Netherlands Board on Research Integrity). They are obliged to review your data on a strictly confidential basis. You will be asked for your consent to this inspection. If you refuse to do so, you will not be able to participate in the study.

Some people and organisations need to have access to your personal and research data. This is necessary to verify that the research has been conducted properly and reliably. These persons and supervisory authorities who can see your data for review include: authorised persons within the Behavioral Science Institute or Radboud University (e.g. a dean, director or data officer) and (inter)national supervisory authorities (e.g. the Dutch Data Protection Authority and the Netherlands Board on Research Integrity). They are obliged to review your data on a strictly confidential basis. You will be asked for your consent to this inspection. If you refuse to do so, you will not be able to participate in the study.

Radboud University is responsible for complying with the General Data Protection Regulation (GDPR) when processing your personal data. The researcher will ensure that your privacy and related conditions are protected and he/she will adhere to the Dutch Code of Conduct for Scientific Integrity and the University Policy on the Storage and Management of Personal and Research Data when conducting this research. The Radboud University privacy policy can be found at: <https://www.ru.nl/english/vaste-onderdelen/privacy-statement-radboud-university/>. If you have any questions about data protection, please contact the Data Protection Officer of the Faculty of Social Sciences (P.Janssen@socsci.ru.nl). For general questions, please contact the Radboud University Data Protection Officer's office at privacy@ru.nl. For more information about your rights regarding the processing of your personal data, please visit <https://www.ru.nl/privacy/english/protection-personal-data/data->

subjects-rights/ and the website of the Dutch Data Protection Authority
(<https://autoriteitpersoonsgegevens.nl/en>).

Your participation in this study is completely voluntary. If you decide not to participate, there will be no consequences. If you wish to end your participation while completing the survey, you have every right to do so. Again, there will be no adverse consequences for you.

However, the data will be collected anonymously and cannot be linked to you. This means that once you have given your consent and completed the survey, you cannot withdraw your consent and your data cannot be deleted.

If you have any questions, comments or concerns about this study, please contact the responsible researcher (Lea Ellerich, lea.ellerich@ru.nl) or the supervisor of this research (Wolter Pieters, Behavioural Science Institute of Radboud University Nijmegen, wolter.pieters@ru.nl).

Yours sincerely,
Lea Ellerich

Lea.ellerich@ru.nl
Faculty of Social Sciences,
Radboud University Nijmegen

Dear participant,

Thank you for your interest in this study.

Before you decide to participate, please take some time to read and understand the following information.

I hereby confirm that:

- I have been given sufficient written information about the study
- I have read the written information
- I have been given the opportunity to ask questions about the study
- my questions have been answered satisfactorily
- I have been given sufficient opportunity to reflect on my participation in the study.
- participation in the study is on a voluntary basis.

I understand that:

- I can stop the survey at any time without consequences
- this survey is anonymous
- the answers I give cannot be traced back to me and the data cannot be deleted after the survey has been completed
- my personal data will be processed in accordance with the applicable European data protection legislation and the Radboud University privacy policy (<https://www.ru.nl/english/vaste-onderdelen/privacy-statement-radboud-university/>).

I agree that:

- my personal and research data will be collected as part of this survey for scientific purposes and will be available for review, reuse and replication for 10 years
- the signed consent form containing my personal data will be kept for 10 years
- regulatory authorities may access my personal data and research data for the purpose of reviewing the research.

Appendix C

Demographic questions

- Welchem Geschlecht fühlen Sie sich zugehörig / *Which gender do you feel belonging to?*
 - Mann / *Man*
 - Frau / *Woman*
 - Nicht Binär, drittes Geschlecht / *non-binary, third gender*
 - Möchte ich lieber nicht sagen / *I'd rather not say*
- Wie alt sind Sie / *How old are you?*
 - 18-25
 - 26-35
 - 36-45
 - 46-55
 - 56-65
 - über 65 / *above 65*
- In welcher Branche arbeiten Sie / *In which sector do you work?*
 - Bauen und Wohnen / *Construction and housing*
 - Finanz- und Unternehmensdienstleistungen / *financial and business services*
 - andere Dienstleistungen / *other services*
 - Handel und Gastronomie / *trade and catering*
 - IT-Branche / *IT sector*
 - Industrie / *industry*
 - Landwirtschaft und Umwelt / *agriculture and environment*
 - Bildung / *education*
 - Regierung und Politik / *government and politics*
 - Marketing, PR, Werbung / *marketing, PR, advertising*
 - Medien / *media*
 - Sicherheit und Justiz / *security and justice*
 - Verkehr und Transport / *traffic and transport*
 - Freizeit und Kultur / *leisure and culture*
 - Wissenschaft, Forschung / *science, research*
 - Gesundheitswesen / *healthcare*
 - andere nämlich / *other namely*

Appendix D

Factor analyses

Table D1

Results from a Factor Analysis of the German Version of the thinking style scale (ReiM-13; McGuinness et al., 2019)

	Factor loading			
	1	2	3	4
Factor 1: rationality				
Ich bin nicht sehr gut darin, Probleme zu lösen, die sorgfältige logische Analyse benötigen ¹ . <i>I am not very good in solving problems that require careful logical analysis¹.</i>	.61	.07	.07	-.30
Dinge sorgfältig zu durchdenke, gehört nicht zu meinen Stärken ¹ . <i>Reasoning things out carefully is not one of my strong points¹.</i>	.59	.01	.03	-.02
Ich mag intellektuelle Herausforderungen. <i>I enjoy intellectual challenges.</i>	.51	.12	.07	.13
Ich mag Probleme, die hartes Nachdenken benötigen. <i>I enjoy problems that require hard thinking.</i>	.52	-.19	-.01	.24
Factor 2: imagination				
Ich lese gerne Dinge, die visuelle Bilder hervorrufen. <i>I enjoy reading things that evoke visual images.</i>	-.02	.59	.03	.14
Ich kann mir eine Skulptur oder ein natürliches (nicht lebendiges) Objekt, das ich sehr schön finde, deutlich vorstellen oder mich daran erinnern. <i>I can clearly picture or remember some sculpture or natural object (not alive) that I think is very beautiful.</i>	.02	.73	-.05	.04
Ich stelle mir gerne Dinge vor. <i>I enjoy imagining things.</i>	-.00	.73	-.04	-.07
Factor 3: intuition				

Ich glaube es ist keine gute Idee, sich bei wichtigen Entscheidungen auf die eigene Intuition zu verlassen ¹ . <i>I don't think it is a very good idea to rely on one's intuition for important decisions¹.</i>	.19	-.04	.49	.01
Ich verlasse mich oft auf meinen Instinkt, wenn ich mich für eine bestimmte Vorgehensweise entscheide. <i>I often go by my instincts when deciding on a course of action.</i>	-.16	.02	1.00	-.00
Ich vertraue auf meinen ersten Eindruck bei Menschen. <i>I trust my initial feelings about people.</i>	.18	-.06	.42	.02
Factor 4: emotionality				
Gefühle bedeuten nicht wirklich viel: Sie kommen und gehen ¹ . <i>Emotion's don't really mean much: they come and go¹.</i>	.15	.10	.08	.31
Wenn ich eine starke emotionale Erfahrung gemacht habe, wirkt diese noch lange nach. <i>When I have a strong emotional experience, the effect stays with me for a long time.</i>	-.00	.02	.07	.69
Wenn ich Traurig bin, ist das oft ein sehr starkes Gefühl. <i>When I'm sad, it's often a very strong feeling.</i>	-.03	.01	-.08	.74

Note. $N = 95$. The extraction method was maximum likelihood with promax rotation. Factor loadings above .30 are in bold. ¹Items have been reverse coded. The original English version of each item is depicted in italic.

Table D2

Results from a Factor Analysis of the German Version of the TL-scale (adapted from Rafferty & Griffin, 2004)

	Factor loading				
	1	2	3	4	5
Factor 1: vision					
Ich habe ein klares Verständnis dafür, wohin wir gehen. <i>I have a clear understanding of where we are going.</i>	.63	.09	-.00	-.05	.17
Ich habe eine klare Vorstellung davon, wo ich unsere Abteilung in 5 Jahren sehen möchte. <i>I have a clear sense of where I want our unit to be in 5 years.</i>	.72	.10	.05	.02	-.08
Ich habe keine Ahnung wohin die Organisation geht ¹ . <i>I have no idea where the organization is going¹.</i>	.71	-.18	-.00	.02	-.01
Factor 2: inspirational communication					
Ich sage Dinge, die die Mitarbeiter stolz machen, teil dieser Organisation zu sein. <i>I say things that make employees proud to be part of this organization.</i>	.03	.87	-.11	-.05	-.07
Ich sage positive Dinge über die Abteilung. <i>I say positive things about the work unit.</i>	-.14	.67	.09	.07	.07
Ich ermutige Menschen, Veränderungen im Umfeld als Chancen zu begreifen. <i>I encourage people to see changing environments full of opportunities.</i>	.14	.25	.38	.05	.04
Factor 3: intellectual stimulation					
Ich fordere meine Mitarbeiter heraus, über alte Probleme auf neue Weise nachzudenken. <i>I challenge my subordinates to think about old problems in new ways.</i>	-.09	-.05	.80	-.04	.01
Ich habe Ideen, die meine Mitarbeiter dazu gezwungen haben, Dinge zu überdenken, die sie nie zuvor hinterfragt haben. <i>I have ideas that have forced my subordinates to rethink some things they have never questioned before.</i>	-.01	.06	.67	.05	-.11

<i>Ich habe meine Mitarbeiter herausgefordert, einige ihrer Grundannahmen über ihre Arbeit zu überdenken. I have challenged my subordinates to rethink some of their basic assumptions about their work.</i>	.19	-.12	.60	-.02	.02
Factor 4: supportive leadership					
<i>Ich berücksichtige die persönlichen Gefühle meiner Mitarbeiter bevor ich handel. I consider my subordinates' personal feelings before acting.</i>	.02	.01	.00	.79	-.08
<i>Ich verhalte mich auf eine Weise, die die persönlichen Bedürfnisse meiner Mitarbeiter berücksichtigt. I behave in a manner which is thoughtful of my subordinates' personal needs.</i>	-.05	-.05	.02	1.01	.04
<i>Ich sehe zu, dass die Interessen der Mitarbeiter angemessen berücksichtigt werden. I see that the interests of employees are given due consideration.</i>	.04	.06	-.03	.48	.13
Factor 5: personal recognition					
<i>Ich lobe meine Mitarbeiter, wenn sie eine überdurchschnittliche Leistung erbringen. I commend my subordinates when they do a better than average job.</i>	.07	.00	-.10	.09	.69
<i>Ich erkenne Verbesserungen in der Qualität der Arbeit meiner Mitarbeiter an. I acknowledge improvement in their quality of work.</i>	.12	-.01	-.08	.06	.61
<i>Ich lobe meine Mitarbeiter persönlich, wenn sie herausragende Arbeit leisten. I personally compliment them when they do outstanding work.</i>	-.13	-.01	.11	-.09	.98

Note. $N = 95$. The extraction method was maximum likelihood with promax rotation. Factor loadings above .30 are in bold. ¹Items have been reverse coded. The adapted English version of each item is depicted in italic.

Table D3

Results from a Factor Analysis of the German Version of the expression of positive emotion scale (BEQ positive expressivity subscale; Gross & John, 1995).

	Factor loading
	1
<hr/>	
Factor 1: positive expressivity	
Wenn ich glücklich bin, zeigen sich meine Gefühle. <i>When I'm happy, my feelings show.</i>	.76
Wenn ich positive Emotionen empfinde, können die Menschen genau sehen, was ich fühle. <i>Whenever I feel positive emotions, people can easily see exactly what I am feeling.</i>	.69
<i>Ich lache laut, wenn mir jemand einen Witz erzählt, den ich lustig finde. I laugh out loud when someone tells me a joke that I think is funny.</i>	.45
Ich bin ein gefühlsbetonter Mensch. <i>I am an emotionally expressive person.</i>	.38

Note. $N = 95$. The extraction method was maximum likelihood with promax rotation. Factor loadings above .30 are in bold. ¹Items have been reverse coded. The original English version of each item is depicted in italic

Hierarchical Multiple Regression Analysis

Table E1

Hierarchical Multiple Regression Analysis Predicting Transformational Leadership From Thinking Styles And Expression of Positive Emotion

Variable	Transformational Leadership		Model 2		
	Model 1 β	Model 1 B	β	B	95% CI
Rationality	.22*	0.45	.20*	0.19	[0.02, 0.78]
imagination	.19	0.47	.16	0.25	[-0.11, 0.89]
intuition	.13	0.37	.08	0.28	[-0.35, 0.78]
emotionality	-.00	-0.00	.03	0.30	[-0.52, 0.68]
Expression of positive emotion	.21	0.52	.20	0.29	[-0.08, 1.07]
Emotionality x expression of positive emotion			.21*	0.12	[0.02, 0.49]
R ²	.24		.28		
F	5.55**		5.61**		
ΔR^2			.04		
ΔF			4.74*		

Note. N = 95. CI = confidence interval.

*p < .05. **p < .01