WORK, INDUSTRIAL & ORGANISATIONAL PSYCHOLOGY | RESEARCH ARTICLE

The Pattern of Executive Professionals’ Thinking Styles in Relation to Cognitive Styles and Metacognition Skills

Garima Saini¹, Shabnam¹, Seema¹ and Vaibhav Bhatnagar²*

Abstract: In this era of globalization, thinking styles of the professionals hold significant prominence in the leadership development. Cognitive aspects of professionals including thinking, attitudes, and motivation are great concerns of managerial psychology, which escalate organizational productivity as, different occupations reinforce different thinking, cognitive and metacognitive styles. This paper proposes to conduct the research gap of studying the effect of cognitive styles and metacognition styles on thinking styles in order to find out the preference of different thinking styles in professionals at executive positions. Smart PLS 3.3.2 software has been used to execute partial least squares structural equation modeling (PLS-SEM) for the research framework on a sample of 453 top-executive professionals working in different public and private firms in northern India. Six hypotheses were framed in the study. PLS-SEM supported five out of six hypotheses as per their respective models. Results indicate that professionals’ cognitive and metacognition skills influence their thinking styles. This study encourages the task-oriented workplace deployment as a solution of evolving organizational productivity. When practiced in organizations, it boosts the workplace expectations and organizational requirements giving birth to greater creativity. Implications, limitations, and suggestions for future research are also added.

Subjects: Cognitive Psychology; Thinking, Reasoning & Problem Solving; Cognitive Science

ABOUT THE AUTHORS

Garima Saini is a Ph.D. scholar in Psychology at NIT Kurukshetra, with interests in Cognitive and Organizational Psychology. She is now exploring the psychological implications in field of robotics and cybersecurity. She has published research articles indexed in ABDC, SCOPUS & WOS databases.

Shabnam is currently working as Assistant Professor, Psychology at NIT Kurukshetra. She has more than ten years of enriched experience in teaching and research. Her research interests include Cognitive Psychology, Neuropsychology, Decision Making, Attention and Organizational Psychology. She has presented and published more than fifty research papers in national & international conferences of repute.

Seema is pursuing PhD in HRM from, NIT Kurukshetra, India. Her research interests include Non-standardEmployments, Industrial & Organizational Psychology out of which she has presented various papers in reputed national & international conferences & published her work with publishers of international repute including Springer, Elsevier and Taylor & Francis.

Vaibhav Bhatnagar is Assistant Professor in Department of Computer Application at School of Basic Sciences, Manipal University Jaipur. He possesses more than eight years of teaching and research experience in the areas of Data Science, Visual Programming and Information Technology. He has presented and published various research papers in conferences and journals of international repute.
Keywords: Cognitive styles; Metacognition skills; Thinking styles; Top Executive Professionals

1. Introduction
Thinking styles can be described as the favorable ways of using human abilities and skills that help individuals in interpreting and understanding situations. They are the preferred ways in which an individual applies intellectual capacity and ability to solve a problem. They help the individuals in perceiving information, problem solving, decision-making, planning, and effective communication. Every individual deals with the problems/situations and tries to solve them in their unique way (Sternberg, 2009). Individuals may seem to have equal intelligence levels in general but their abilities to focus and problem-solving differ. Some individuals perform their tasks in a unique way reflecting their creativity, whereas others may complete the task in very classical and traditional ways depending on the abilities they possess. Thinking styles cannot be addressed as a single ability instead they are the collective abilities possessed by the individuals (Zhang, 2007). Various scholars working in the field of thinking styles have done a commendable job and evaluated this field of styles very critically. The studies related to individual differences in thinking styles concluded that some perform the tasks in a systematic way while others defy orderly systematic approach (Zhang, 2010b).

The theory of mental self-government has divided thinking styles into five broad dimensions: functions, forms, levels, scopes, and learnings (Sternberg, 2001) (Table 1). These thinking styles influence and relate with one another in a divergent way and sometimes coexist which varies with the situations. This theory further divides these broad dimensions of thinking styles into 13 thinking styles, namely, legislative, executive, judicial, hierarchic, monarchic, anarchic, oligarchic, local, global, external, internal, conservative, and liberal styles of thinking (Sternberg, 2015). From this theory, we have used functions type of thinking styles, which include legislative, executive, and judicial thinking styles (Sternberg, 2009). In legislative thinking style, individuals perform the tasks in a unique, novel, and creative way; individuals with executive thinking style deal the situation with the rules framed by the society; judicial thinking style lets the individual to be evaluative, analytical, judgmental, and comparative for the existing strategies and norms (Zhang, 2012). Different individuals opt for different careers and perform or accomplish tasks in different ways depending upon their capacities and abilities with respect to their career choices (Holland, 2015). Professionals work differently depending upon the activities related to their competencies and abilities. Different styles of thinking and other cognitive abilities are reinforced by different occupations (Sterenberg & Zhang, 2016).

The abilities of problem-solving and performing a task vary from one career to another; say an entrepreneur solves the problems in an organizational manner, scientists focus on understanding and managers and mid-level engineers focus on the troubleshooting side of problem solving (Farhoush & Ahmadi, 2013). A Comparative study reveals that artists often prefer internal styles of thinking, while engineering professionals focus on external styles and inputs persuading the hierarchical thinking styles (Gridley, 2014). IT professionals evidently prefer legislative, executive, hierarchical, and external thinking styles when performing a task (Huincahue et al., 2019). Thinking styles of high-level workers state that they choose realism trait while performing a task (Schmid, 2001). The cognitive styles and abilities also vary in professionals working in rural and urban areas (Asrami, 2016). Cognitive styles are preferred in a strategic and stable manner by working professionals who seek help in problem-solving and task completion. These styles are the specific traits of personality that cannot be changed with time (Zhang, 2001). Cognitive styles of planners, designers, accountants, and machine engineers show more indications towards convergent thinking as compared to divergent thinking. Cognitive styles propose various alternatives to differentiate between entrepreneurs and non-entrepreneurs by their ways of dealing and solving the problems (Allinson et al., 2000a). Professionals such as accountants have systematic cognitive styles who complete the tasks in an efficient and organized way applying norms in classifying and analyzing the solutions. Artists have intuitive cognitive styles that help them in analyzing and providing solutions by linking pieces in a holistic manner (Sagiv et al., 2010). Cognitive styles of management
and engineering students show different preferences. Judicial, hierarchical, and legislative styles are found in management students; monarchical and local styles are possessed by engineering students (Groves & Vance, 2015). Systematic cognitive styles predict problem-solving styles among technicians, scientists, and engineers who mostly represent the centralized R&D facilities in corporations (Smith, 2004). Designing an activity and its effect on the performance with respect to cognitive styles of scientists has been studied focusing on the scientific creativity and research styles by few of the researchers (Bensley & Spero, 2014). Practitioners, researchers, and engineering professionals show a preference towards systematic cognitive styles that help them in performing and achieving their goals (Greene, 2016). Cognitive development was heightened after the work of J. Flavell in 1970. Cognitive abilities help the individuals by developing the required skills making metacognition and cognitive styles as efficient predictors boosting their performance (Bensley & Spero, 2014).

Metacognition can be better understood as a general term that encompasses the study of memory-monitoring, self-regulation, meta-reasoning, awareness, and self-awareness. These are the abilities to regulate one’s own cognition, to maximize one’s potential to think, learn, and evaluate (Flavell, 1979). Metacognition skills in working professionals with different careers have been analyzed in the past and are reported to contribute in critical thinking, learning, and problem-solving abilities (Kesici et al., 2011). It is also stated that IT engineers’ performance can be increased and regulated with proper implications of metacognitive learning. Combining the metacognitive abilities and setting their priorities increases the team performances (Newell et al., 2004). Team work in different occupation pokes the critical thinking that increases the metacognition awareness (Bensley & Spero, 2014). Metacognition skills in experts help them in problem-solving and planning (Dixon, 2010). Metacognitive skills also help professionals in perceiving information making it comprehensive and retainable in memory (Valeyeva et al., 2017). Legislative and judicial thinking styles significantly contribute to the metacognition skills (Braojos, 2013). Knowledge, a component of metacognitive skill also has shown high correlation with external and internal (scope) thinking styles (Heidari & Bahrami, 2012). Metacognition skills are defined as self-rated abilities, which predict hierarchical, legislative, and liberal thinking styles (Zhang, 2010a). Further, mechanical engineering students noticed a change in performance while engaging metacognition abilities in project designing (Lawanto, 2010). Cognitive styles and metacognition skills affect the thinking styles of the engineers (Saini & Shabnam, 2020). Cognitive processes and metacognitions predominantly determine the lifelong learning competency of students and contribute in their personal development (Volodymyr et al., 2020).

2. Theoretical framework of the study
In this study, the effect of metacognitive skills and cognitive styles correlates are studied on thinking styles. Metacognitive correlates are planning, monitoring, implementation, and evaluation skills (Gupta and Suman, 2017). Cognitive styles are measures from systematic and intuitive cognitive styles (Jha, 2001). The theory of mental self-government in the field of thinking styles focuses on the coexistence of individual differences with the way individuals manage their tasks. Mental self-government has divided thinking styles into five broad dimensions, that is, functions, forms, levels, learnings, and scopes (Sternberg, 2001). These five dimensions are further divided into 13 thinking styles, namely, judicial styles, legislative styles, executive styles, oligarchic styles, hierarchical styles, monarchical styles, anarchic styles, local styles, global styles, external styles, internal styles, liberal styles, and conservative styles (Sternberg, 2009). Socialization often reshapes the thinking styles (Sternberg, 2006). These thinking styles relate and influence each other in divergent ways and sometimes coexist depending upon the situation. Metacognition of the individuals is the complementary and interacting element of knowing and regulating the thinking and the cognitive processes. The researches on metacognition are relevant to cognitive styles and thinking styles in a way that the individual is aware of his/her cognitive and learning processes. These metacognitive skills are central to planning, monitoring, evaluation, and problem solving (Zhang, 2002). Cognitive styles depend upon the identification of styles focusing on the individual differences in perceptual and cognitive functioning (Grigorenko & Sternberg, 1995).
Cognitive styles investigate the individual differences in responding to and distracting from the information that increases the neural conflicts in brain associated with cognitive control (Shin & Kim, 2015). Systematic cognitive styles help an individual in applying rule-based thinking (Smith & De Coster, 2000). Systematic cognitive styles logically and analytically focus on the alternatives in discovering the existing rules. This helps in organizing into systematic way leading towards choosing the right way to act (Perkins, 1981; Scott & Bruce, 1995). Intuitive cognitive styles help individuals in applying associative thinking (Smith & De Coster, 2000) and experiential thinking (Norris & Epstein, 2011). Individuals with these thinking styles are often unaware of the thinking patterns and have global and holistic perception (Scott & Bruce, 1995). Intuitive thinking styles associate with intuition and takes account of feelings and context including facts (Perkins, 1981).

3. Materials and methods

3.1. Objectives

(1) To determine the effect of metacognition correlates on legislative, executive, and judicial thinking styles.

(2) To examine the repercussion of cognitive correlates on legislative, executive, and judicial thinking styles.
| Thinking styles       | Predilection in tasks/projects | Metacognition Correlates             | Predilection in tasks/projects | Cognitive Styles Correlates                                      | Predilection in tasks/projects |
|----------------------|--------------------------------|-------------------------------------|--------------------------------|-----------------------------------------------------------------|-------------------------------|
| Legislative thinking styles | Planning of ideas, creation of products and formulations of strategies. | Planning skills | Deciding and planning how to perform a task | Systematic Cognitive Styles | It helps an individual in applying rule-based, organized logical and analytical Thinking |
|                      |                                | Evaluations skills                 | To what extent the objectives are made | Intuitive cognitive styles                                      | Individuals apply associative experiential thinking patterns and have global and holistic perception |
| Executive thinking styles | Situations and projects provide procedure, structure and existing rules to complete the task | Implementation skills | The strategies that are implemented to achieve the goal |                                                                      |                                |
| Judicial thinking styles | Evaluations, comparison, analysis and judgment of existing strategies and ideas. | Monitoring skills | Tracking the strategies to perform effectively |                                                                      |                                |
3.2. Hypothesis

The following are the hypothesis of the study that are formulated on previous researches and literature review done in this field.

H1- Planning skills show positive interrelation with executive and legislative thinking styles.

H2- Monitoring skills show positive impact on judicial thinking styles.

H3- Implementation skills contribute to legislative, executive, and judicial thinking styles.

H4- Evaluation's skills positively correlate with judicial and legislative thinking styles.

H5- Systematic cognitive styles contribute to legislative and executive thinking styles.
H6- Intuitive cognitive styles show correlation with legislative thinking styles. (Figure 1)
3.3. Research instruments

Dimensions of thinking styles, cognitive styles, and metacognition skills were measured with standardized tools on five-point Likert-type scale. Thinking Style Inventory (Sternberg & Wagner & Zhang,
2007) includes 65 items, which measure 13 styles of thinking; legislative, executive, judicial, oligarchic, hierarchic, monarchic, anarchic, external, internal, local, global, liberal, and conservative thinking styles having a reported reliability of 0.81. Cognitive-style inventory (Jha, 2001) has 40 items, which measure intuitive and systematic cognitive styles with reliability reported as 0.80. Metacognition skill scale (Gupta and Suman, 2017) assess these skills through 42 items measuring planning, monitoring, implementation, and evaluation skills having the reliability of 0.85.

### 3.4. Sample design and data analysis

This empirical study was conducted on executive-level professionals working in different occupations of various private and public sector firms in north Indian states of Delhi & NCR, Jammu & Kashmir and Haryana. The data was collected through purposive sampling technique having a face-to-face interaction with 453 top-executive professionals. In minimum sample adequacy of PLS 3.3.2 software, N is 100 (Hair et al., 2016). So, it can be stated that the sample of present study very well exceeds the minimum sample adequacy. The sample consists of males and females of age 35–60 years. There are 279 male and 174 female responses received in this sample. Questionnaires were administered to individuals who were willing to participate in the survey. The processing of data was done on Partial Least Square Structural Equation Modeling (PLS-SEM) analysis with software Smart PLS version 3.3.2. To extract the results, a two-level analytical procedure is followed which includes examining the reliability and validity, i.e., measurement model and then the structure (Saini et al., 2022).

### 4. Results

#### 4.1. Objective-wise examination of relationships between variables

##### 4.1.1. Implementation skills and thinking styles

**4.1.1.1. Measurement model.** The values of average variance extracted, cronbach’s alpha and composite reliability are to be shown in the measurement model. Table 2 shows the values of composite reliability for implementation skills, legislative styles, judicial styles, and executive styles as 0.734, 0.834, 0.836, and 0.804, respectively. The values of Cronbach’s alpha for these include implementation skills (0.733), legislative styles (0.812), judicial styles (0.746), and executive styles (0.741) showing high degree of reliability. For composite reliability and cronbach’s alpha, the value greater than or equal to

### Table 6. Reliability and validity of the constructs

| Construct                  | Composite Reliability | Cronbach’s alpha | AVE  |
|----------------------------|-----------------------|------------------|------|
| Systematic cognitive styles| 0.959                 | 0.956            | 0.650|
| Legislative styles         | 0.739                 | 0.721            | 0.531|
| Judicial styles            | 0.852                 | 0.756            | 0.543|
| Executive styles           | 0.863                 | 0.842            | 0.583|

(Source: Data Processed)

### Table 7. Reliability and validity of the constructs

| Construct                  | Composite Reliability | Cronbach’s alpha | AVE  |
|----------------------------|-----------------------|------------------|------|
| Intuitive cognitive styles  | 0.952                 | 0.943            | 0.742|
| Legislative styles         | 0.780                 | 0.761            | 0.653|
| Judicial styles            | 0.712                 | 0.706            | 0.593|
| Executive styles           | 0.937                 | 0.912            | 0.710|

(Source: Data Processed)
| HYPOTHESIS | PATH | COEFFICIENT | T-value | P-value |
|------------|------|-------------|---------|---------|
| H1 | Planning skills→Executive styles | 0.83 | 8.76 | 0.00 |
| H1 | Planning skills→Legislative styles | 0.67 | 7.23 | 0.00 |
| H1 | Monitoring skills→Judicial style | 0.84 | 8.78 | 0.00 |
| H2 | Implementation skill→Legislative styles | 0.63 | 6.98 | 0.01 |
| H2 | Implementation skill→Executive skills | 0.61 | 6.82 | 0.01 |
| H2 | Implementation skill→Judicial styles | 0.67 | 7.23 | 0.00 |
| H3 | Evaluation skills→Legislative styles | 0.84 | 8.73 | 0.00 |
| H3 | Evaluation skills→Executive skills | 0.85 | 8.79 | 0.00 |
| H3 | Evaluation skills→Judicial styles | 0.63 | 6.98 | 0.01 |
| H4 | Systematic cognitive styles→Executive styles | 0.40 | 4.36 | 0.00 |
| H4 | Systematic cognitive styles→Legislative styles | 0.33 | 3.33 | 0.01 |
| H5 | Intuitive cognitive styles→Legislative styles | 0.40 | 4.36 | 0.00 |

Source: Data Processed

Saini et al., Cogent Psychology (2022), 9: 2068741
https://doi.org/10.1080/23311908.2022.2068741
0.70 is acceptable (Hair et al., 2016). Convergent validity in the model is reflected by its Average Variance Extracted (AVE) (Fornell & Larcker, 1981). The values of AVE for implementation skills, legislative styles, judicial styles and executive styles are 0.502, 0.516, 0.542, and 0.532, respectively.

4.1.2. Structural model. The relationship between endogenous and exogenous variables is assessed with the structural model and coefficient of determination (R²) is the most important construct here. Figure 2, depicts the path model diagram showing the effect of implementation skills on legislative, executive, and judicial thinking styles where in the value of (R²) 0.406 depicts that the constructs implementation skills explain 40% variance of endogenous variable legislative thinking styles. The model shows the direct positive effect of implementation skills (0.638) on legislative thinking styles. The R² value 0.452 of the implementation skills on judicial thinking styles explains 45% of the variance with positive effect of 0.672. The implementation skills on executive thinking styles shows the R² value of 0.374, that is, 37% and strong effect of 0.672 in the model.

4.1.2.1. Planning skills and thinking styles
4.1.2.1. Measurement model. As mentioned earlier, measurement model studies the effect of planning skills on thinking styles from the values of composite reliability, cronbach’s alpha and AVE. For cronbach’s alpha and composite reliability the value of 0.7 is justifiable (Hair et al., 2016). Table 3 shows the composite reliability value 0.95 for planning skills, 0.85 for legislative styles, 0.89 for judicial styles, and 0.71 for executive styles. Cronbach’s alpha values of 0.94, 0.81, 0.87, 0.70 are for planning skills, legislative styles, judicial and executive styles, respectively. Convergent validity in the model is reflected by its Average Variance Extracted (AVE) (Fornell & Larcker, 1981). Convergent validity of the model is measured by the AVE values 0.630, 0.546, 0.682, and 0.506 for planning skills, legislative styles, judicial styles, and executive styles, respectively.

4.1.2.2. Structural model. R² and beta (β) values are used to assess the structural model (Hair et al. 2017). The relationships between endogenous and exogenous constructs are studied. Coefficient of determination (R²) is looked up to assess the effect of metacognitive correlate planning skills on legislative, executive, and judicial thinking styles. In Figure 3, the path diagram shows the value (R²) and beta values. The results depict that exogenous construct planning skills explains the 70.1% of variance on endogenous construct executive thinking styles. The estimation of R² value of 0.455 explains the 45% variance of planning skills on legislative thinking styles. The R² value of 0.23 of planning skills on executive thinking styles is not an acceptable value. A direct strong effect of planning skills on executive thinking styles (0.83) followed by legislative thinking styles (0.67) is indicated.

4.1.3. Evaluation skills and thinking styles
4.1.3.1. Measurement model. In measurement model, Table 4 shows the values for composite reliability, which are 0.86, 0.70, 0.74, and 0.69 for evaluation skills, legislative styles, judicial styles, and executive styles, respectively. The value of cronbach’s alpha for evaluation skills, judicial thinking styles, executive styles, and legislative styles are 0.81, 0.70, 0.73, and 0.69, respectively. The value of 0.7 for composite reliability and cronbach’s alpha is justifiable (Hair et al., 2016). The indicator’s variance in the model is studied through the convergent validity AVE value for evaluation skills (0.52), judicial thinking styles (0.52), executive styles (0.50), and legislative styles (0.52) are also indicated for this model in Table 4.

4.1.3.2. Structural model. As known already that in the structural model, the construct’s relationships are studied through the value s(R²) and beta. The relationships between the constructs, that is, effect of evaluation skills on thinking styles are studied. In Figure 4, the path diagram shows the value (R²) and beta values. The results depict that exogenous construct evaluation skills explain 72% of variance on endogenous construct judicial thinking styles. The estimation of R² value of 0.459 explains the 45% variance of evaluation skills on legislative thinking styles. The R² value of 0.192, that is, 19% of evaluation skills on executive thinking styles is not an acceptable value.
A direct strong effect of evaluation skills on judicial thinking styles (0.849) followed by legislative thinking style (0.677) is indicated.

4.1.4. Monitoring skills and thinking styles

4.1.4.1. Measurement model. Table 5 shows the values for composite reliability that are 0.91, 0.88, 0.72 and 0.68 for monitoring skills, judicial thinking styles, executive styles, and legislative styles, respectively. The value of cronbach’s alpha for monitoring skills, judicial thinking styles, executive styles, and legislative styles are 0.89, 0.86, 0.71, and 0.67, respectively. The value of 0.7 for composite reliability and cronbach’s alpha is justifiable (Hair et al., 2016). AVE value for monitoring skills (0.63), judicial thinking styles (0.62), executive styles (0.53), and legislative styles (0.49) are also indicated for the model in Table 5.

4.1.4.2. Structural model. The relationship between the constructs is studied through the value $s(R^2)$ and beta values. The relationship between the constructs, that is, effect of monitoring skills on thinking styles are studied. In Figure 5, the path diagram shows the value $(R^2)$ and beta values. The results depict exogenous construct monitoring skills explains the 70.6% of variance on endogenous construct judicial thinking styles. The estimation of $(R^2)$ value of 0.246 explains the 24% variance of monitoring skills on executive thinking styles. The $R^2$ value of 0.075 of monitoring skills on legislative thinking styles is not an acceptable value. A direct strong effect of monitoring skills on judicial thinking styles 0.840 is indicated.

4.1.5. Systematic cognitive styles and thinking styles

4.1.5.1. Measurement model. Table 6 shows the values for composite reliability, which are 0.95, 0.73, 0.85, 0.86 for systematic cognitive styles, legislative styles, judicial thinking styles, and executive styles, respectively. The value of cronbach’s alpha for systematic cognitive styles (.95), legislative styles (.72), judicial thinking styles (.75), and executive styles (.84) are quite acceptable. The value of 0.7 for composite reliability and cronbach’s alpha is justifiable (Hair et al., 2016). AVE value for systematic cognitive styles (0.63), judicial thinking styles (0.54), executive styles (0.58), and legislative styles (0.53) are also indicated for the model in Table 6.

4.1.5.2. Structural model. In structural method, the coefficient of determination $(R^2)$ is the most important construct. Figure 6, depicts the path model diagram showing the effect of systematic cognitive styles on legislative, executive, and judicial thinking styles. The value of $(R^2)$ 0.724 depicts that the constructs systematic cognitive styles explain 72% variance of endogenous variable executive thinking styles. The model shows the direct strong positive effect of systematic cognitive styles (0.851) on executive thinking styles. The $R^2$ value 0.401 explains 40% variance of legislative thinking styles with positive effect of 0.633. But the impact of systematic cognitive styles on judicial thinking styles shows the $R^2$ value of 0.180, that is, 18%, which is not justifiable and an effect of 0.424 in the model.

4.1.6. Intuitive cognitive styles and thinking styles

4.1.6.1. Measurement model. Composite reliability for intuitive cognitive styles, legislative styles, judicial thinking styles, and executive styles are 95, 78, 71, and 93, respectively. The value of cronbach’s alpha for intuitive cognitive styles (.94), legislative styles (.76), judicial thinking styles (.70), and executive styles (.91) are all fit. The value of 0.7 for composite reliability and cronbach’s alpha is justifiable (Hair et al., 2016). AVE value for intuitive cognitive styles (0.74), judicial thinking styles (0.59), executive styles (0.71), and legislative styles (0.65) are also indicated for the model in Table 7.

4.1.6.2. Structural model. Figure 7, depicts the path model diagram showing the effect of intuitive cognitive styles on legislative, executive, and judicial thinking styles. The value of $(R^2)$ 0.161 depicts that the constructs intuitive cognitive styles explain 16% variance of endogenous variable
legislative thinking styles. The model shows the direct positive effect of intuitive cognitive styles (0.402) on legislative thinking styles. The $R^2$ value 0.102 explains 10% variance of judicial thinking styles with positive effect of 0.320. The intuitive cognitive styles on executive thinking styles shows the $R^2$ value of 0.28, that is, less than 1% and negative effect of 0.166 in the model. The values of intuitive cognitive styles on thinking styles are not justifiable and hence this model is not acceptable.

4.2. Hypothesis testing through bootstrapping

4.2.1. Path coefficient
The constructs ramification is assessed by examining the path coefficients value, t-values, and p-values using bootstrapping model. For the model, 1500 sub-sample cases are used to test the hypothesis for the study. Table 8 shows pursuance of structural model, which conforms to our hypothesis. The t values in the table are from the Smart PLS software and p-values are used to accept and reject the hypothesis. The p values are calculated in Excel using command TDIST (x, degree of freedom, tails); say planning→executive thinking styles TDIST (6.960,1499.2). All the models showing the effect of planning, monitoring, implementation, and evaluation skills with legislative, executive, and judicial thinking styles have been tested. Analyzing the path coefficients value, t-values, and p-values, we accept hypothesis H1, H2, H3, and H4. Repeating the process and studying the hypothesis H5 and H6 and analyzing the effect of systematic and intuitive cognitive styles on legislative, executive, and judicial thinking styles, H5 is accepted, and H6 is not accepted.

5. Discussions
Individual differences emphasize the extent to which intellectual capacity and ability can be applied to solve a problem. Psychological aspects in the executive professionals’ lives include reasoning, attitudes, thinking, personality, and motivation that decide how they perform the tasks and meet the goals. The contemporary researches have highlighted the need of studying thinking styles, metacognition, and cognitive styles in professionals with contrasting careers. Their results state that metacognitive skills and cognitive styles affect thinking styles. The cognitive abilities comprising of experience, knowledge, and strategies in professionals evaluate their thought process while working in the organization. These abilities correlate with thinking styles helping in self-reflection and self-regulation of the metacognitive skills and cognitive styles individuals reflect in their tasks. The awareness of metacognition skills in professionals helps in finding the efficacy and effectiveness (Poh, 2016). The present study has been conducted in a systematic way and six hypotheses were developed which include planning skills show positive interrelation with executive and legislative thinking styles; monitoring skills show positive impact on judicial thinking styles; implementation skills contribute to legislative, executive, and judicial thinking styles; evaluations skills positively correlate with legislative and executive thinking styles; systematic cognitive styles contribute to legislative and executive thinking styles and intuitive cognitive styles show correlation with legislative thinking styles.

Analyzing the first hypothesis, that is, planning skills show positive interrelation with executive and legislative thinking styles. Planning skills help the employees for building a roadmap to successfully manage and meet the goals before attempting them. Past empirical evidence also promotes the development of thinking in children by providing the components such as reflection and planning (Epstein et al., 2003). Legislative thinking styles help an individual to complete the task in a unique and novel way whereas executive thinking styles help the individual in dealing the situation with societal rules (Zhang, 2010b). The present results indicate that planning skills; one of the metacognition correlates affect the legislative and executive thinking styles, which help the professionals to plan and execute things according to the situations. So, we accept first hypothesis (H1) for this study.

Moving towards the next hypothesis that is monitoring skills show positive impact on judicial thinking styles. Metacognitive developments and researches focus on the fact that monitoring skills help in regulation of memory and its retrieval. The interest in this field is growing and accompanying
the performance of complex tasks including problem-solving and reasoning (Ackerman et al., 2017). Judicial thinking styles enable an individual to evaluate, compare, analyze, and judge the existing strategies and ideas and come out with his/her own ideas for dealing with problems (Zhang, 2010b). Monitoring skills show a positive strong effect on the judicial thinking styles of the professionals, which help individuals with these styles and skills to evaluate the situations and work accordingly. This result goes well with the second hypothesis (H2) of the study and it is accepted.

The third hypothesis, implementation skills contribute to legislative, executive, and judicial thinking styles when studied in detail states that implementation skills in thinking styles embedded with practical inquiry leads to self-sustaining change (Franke et al., 1998). An empirical study shows that teachers are systematic, analytic, inquisitive, open minded, confident, and reality seeking in thinking when implying their knowledge (Nachiappan et al., 2018). In this study, the implementation skills show positive effect on legislative, executive, and judicial thinking styles, which means professionals when given task or project plans, formulate strategies, evaluate, judge, and analyze the ideas to complete the tasks. Professionals continue learning which helps them in handling new situations and tasks that arise with time. This helps him/her in expanding one’s experimental and theoretical knowledge over time. Therefore, we accept the third hypothesis (H3) as well for this study.

The fourth hypothesis is evaluations skills positively correlate with judicial and legislative thinking styles. A significant relationship is noticed between evaluation skills with judicial and legislative thinking styles (Abdi, 2012). Professionals with these styles are often engaged in analytical and evaluative tasks. This focuses on reflective and reasonable thinking in professionals, which includes the ability to induce, deduce, reason, and practice. Hence, the fourth hypothesis (H4) is accepted. The next hypothesis is systematic cognitive styles contribute to legislative and executive thinking styles. Cognitive styles of professionals reflect their cognition modes of mental processing like perceiving, thinking, attending, imagining, and information processing, which help in acquiring knowledge and problem-solving. The cognition and conceptualization varies with every individual. Systematic cognitive styles predict problem-solving styles among technicians, scientists, and engineers who are the main workforce in the centralized R&D facilities in the corporations. When investigated, the role and nature of systematic cognitive styles in managers and entrepreneurs goes well with the creative thinking styles and helps in decision-making (Smith, 2004). Systematic and rational cognitive styles also help in inhibiting innovative behavior (Scott & Bruce, 1994). The role of systematic cognitive style on thinking styles highlighted that a professional with rational thinking tries to complete the task and solves problem in an executive way; therefore, we accept the fifth hypothesis (H5) also of this study.

Intuitive cognitive styles are usually associated with complex decision-making and creative thinking. These styles are superior to rational and thinking styles. Intuitive processing styles focus on decision-making and thinking leading to more divergent and holistic ways. Novel ideas when applied contribute economically in the small and large firms (Clercq et al., 2011). Empirical researches have explored the association between cognitive styles and entrepreneurial behavior (Allinson, Chell, et al. 2000a). Business owners and managers have intuitive cognitive styles as compared to managers of the organizations. Researches on intuitive styles show relation with legislative thinking styles but in this study the p value came out >0.005 for intuitive cognitive styles, hence hypothesis six (H6) is rejected.

6. Conclusions and implications

The effect of cognitive styles and metacognition skills on thinking styles in working executive professionals is studied. It is established that cognitive abilities are the most preferred ways in which an individual applies one’s intellectual capacity and ability to solve a problem. It helps the professionals in perceiving information, problem solving, decision-making, planning, and effective communication as well. The individual differences in professionals thinking styles and cognitive correlates are also studied and it is concluded that some perform the task in very systematic ways, while others resist orderly systematic approaches. Repercussion of systematic and intuitive cognitive styles (cognitive correlates) and planning, monitoring, implementation, and evaluation skills (metacognition correlates) are
studied to find out the preference on legislative, executive, and judicial thinking styles in professionals. Planning skills show high interrelation with executive and legislative thinking styles; monitoring skills complement with judicial thinking styles; and evaluation skills correlate with judicial and legislative thinking styles. In addition, implementation skills precipitate the legislative, executive, and judicial thinking styles. Professionals with systematic cognitive styles preferably use executive and legislative thinking styles. Intuitive cognitive styles are not determined with any of the thinking styles. These styles are reinforced by different occupations. Studying the ramifications of these constructs boosts learning and motivation in professionals, which results in increasing the performance and meeting the organizational goals and vision.

Professionals thinking styles, cognitive styles, and metacognition skills play an important role in achieving the organizational goals. Traditional literature in the field of professionals elaborate about their working by first planning and directing the resources afterward for achieving the goals ultimately. A professional lead the tasks towards the goals, so understanding one's cognitive styles helps in assigning the duties and other roles like planning, reporting, directing, and budgeting more efficiently. The contribution and increased functioning helps in modulating the ideas of decision-making, creativity, networking, learning, leadership skills, and organizational analysis. Thinking and cognitive styles possessed by the top professionals help in development and growth of various management capabilities of the employees. Different cognitive, metacognitive, and thinking styles are reinforced by different occupations. When tasks are given keeping in mind employee's styles and ability to do the work, one's expertise would increase and the turn-over intentions would also decrease. This would also help in strategic management and total quality management (TQM) in organizations through organizational processes, employee/subordinate role, and control. In long term, this will also boom the organizational productivity. Higher the productivity of the employees, higher the work quality, job performance, and commitment boosting the organizational profit. Working towards the upliftment of these styles increases the employee's quality of work and a positive influence on customers’ and stakeholders’ satisfaction.

Substantial future researches can be directed towards application of thinking styles in relation to cognitive styles and metacognition skills for exercising career profiling and forecasting career success rate of the students aspiring for specialized professions. Successful interventions can be brought using this concept for right recruitment and right fitment also in the corporates.

Funding
The authors received no direct funding for this research.

Author details
Garima Saini1
ORCID ID: http://orcid.org/0000-0003-2284-3263
Shabnam1
Seema1
Vaibhav Bhatnagar2
E-mail: vaibhav.bhatnagar15@gmail.com
1 Department of Humanities and Social Sciences, National Institute of Technology, Kurukshetra, India.
2 Department of Computer Applications, Manipal University Jaipur, India.

Disclosure statement
No potential conflict of interest was reported by the author(s).

Citation information
Cite this article as: The Pattern of Executive Professionals’ Thinking Styles in Relation to cognitive Styles and Metacognition Skills, Garima Saini, Shabnam, Seema & Vaibhav Bhatnagar, Cogent Psychology (2022), 9: 2068741.

References
Abdi, A. (2012). A study on the relationship of thinking styles of students and their critical thinking skills. Procedia - Social and Behavioral Sciences, 47, 1719–1723. https://doi.org/10.1016/j.sbspro.2012.06.889
Ackerman, R., & Thompson, V. A. (2017). Meta-Reasoning: monitoring and control of thinking and reasoning. Trends in Cognitive Sciences, 21(8), 607–617. http://dx.doi.org/10.1016/j.tics.2017.05.004
Allinson, C. W., Chell, E., & Hayes, J. (2000). Intuition and entrepreneurial performance. European Journal of Work and Organizational Psychology, 9(1), 31–43. https://doi.org/10.1080/135943200398049
Asrami, Y. (2016). Comparing different thinking styles and marital satisfaction among engineers of urban and nonurban areas. Journal of Fundamental and Applied Sciences, 13, 67–69. https://doi.org/10.4314/jfas.8v12s.82
Bensley, D. A., & Spero, R. A. (2014). Improving critical thinking skills and metacognitive monitoring through direct infusion. Thinking Skills and Creativity, 12, 55–68. https://doi.org/10.1016/j.tsc.2014.02.001
Brojoos, C. G. (2013). Direct and indirect effects between thinking styles, metacognitive strategies and creativity in college students. Annals of Psychology, 29(1), 159–170. https://doi.org/10.6018/analesps.29.1.12465
Clercq, D., Thongpapani, N., & Dimov, D. (2011). The moderating role of organizational context on the relationship between innovation and firm performance. IEEE Trans Engineering Management, 58(3), 431–444. https://doi.org/10.1109/TEM.2010.2048911.
Greene, M. (2016). A cognitive framework for engineering systems thinking. Proceedings of systems engineering research, 2–7.

Gridley, M. C. (2014). Cross-cultural comparison of engineers’ thinking styles. Psychology Journal, 24, 98–104.

Grigorenko, E. L., & Sternberg, R. J. (1995). Thinking styles. In D. Slukofsky & M. Zeidner (Eds.), International handbook of personality and intelligence (pp. 205–229). Plenum. https://doi.org/10.1007/978-1-4757-5571-8_11

Groves, K. S., & Vance, C. M. (2015). Linear and nonlinear thinking: A multidimensional model and measure. Journal of Creative Behavior, 49(2), 116–119. https://doi.org/10.1002/jcb.60

Gupto, Madh Suman. (2017). Meta-Cognitive Skills Scale. National Psychological Corporation, Agra. https://garp.co.in/JARMSS/Nov2017%2F.pdf

Hair, J. F., Jr., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2016). A primer on partial least squares structural equation modeling (PLS-SEM). Sage publications. https://doi.org/10.4135/9781506308826

Heider, F., & Bohrami, Z. (2012). The relationship between thinking styles and metacognitive awareness among Iranian EFL learners. The International Journal of Linguistics, 4(3), 12–15. https://doi.org/10.5296/ijsl.v4i3.2061

Holland, J. (2015). Making vocational choices: A theory of careers. Prentice-Hall.

Huincuhue, J., Goete-Peralta, C. A., & Garrido-Veliz, V. (2019). Thinking styles and computer engineering training: An empirical study. International Journal of Cognitive Research in Science, Engineering and Education (IJCREE), 7(1), 21–33.

Jha, Praveen. (2001). The Cognitive Styles Inventory. Agra: Rakhi Prakashan (2001) https://ojoji.net/articles/2014/1201-1409663774.pdf

Kesici, S., Erdogan, A., & Ozteke, H. I. (2011). Are the dimensions of metacognitive awareness differing in prediction of mathematics and geometry achievement? Procedia - Social and Behavioral Sciences, 15, 2658–2662. https://doi.org/10.1016/j.sbspro.2011.04.165

Kesici, S., Erdogan, A., & Ozteke, H. I. (2011). Are the dimensions of metacognitive awareness differing in prediction of mathematics and geometry achievement? Procedia - Social and Behavioral Sciences, 15, 2658–2662. https://doi.org/10.1016/j.sbspro.2011.04.165

Lawanto, O. (2010). Students’ metacognition during an engineering design project. Performance. Improvement Quarterly, 9(2), 34–45. https://doi.org/10.1080/piq.20084

Nachippan, S., Osman, R., Masnan, A. H., Mustaf, M. C., & Hussien, H. (2013). The thinking style of teachers towards the implementation of higher order thinking skills in preschool. Proceedings of ISER 129th international conference, Bali, Indonesia, 33–36.

Newell, J., Dohm, K., & Harvey, R. (2004). Developing metacognitive engineering teams. Chemical Engineering Education, 42, 34–69. https://citeeseer.ist.psu.edu/viewdoc/download?doi=10.1.1.473.1499&rep=rep1&type=pdf

Norris, P., & Epstein, S. (2011). An experiential thinking style: Its facets and relations with objective and subjective criterion measures. Journal of Personality, 79(5), 1043–1079. https://doi.org/10.1111/j.1467-6494.2011.00718.x

Perkins, D. N. (1981). The mind’s best work. Harvard University Press.

Poh, L. B. (2016). Assessing the metacognitive awareness among the foundation in engineering students. IAFOR Journal of Education, 16, 53–67. https://eric.ed.gov/?id=ED547205

Sajo, L., Arvedson, G., Goldberg, J., & Goldschmidt, A. (2010). Structure and freedom in creativity: The interplay between externally imposed structure and personal cognitive style. Journal of Organizational Behavior, 31(8), 1086–1110. https://doi.org/10.1002/job.664

Saini, G., & Shabnam. (2020). Ramification of metacognition and cognitive styles on thinking styles with impeding effect of cognitive rigidity in engineers. International Journal of Psychosocial Rehabilitation, 24(2), 4704–4713. https://doi.org/10.37200/IJPR/V24I2/PR2020909

Saini, G., Bhatnagar, V., Seema, L., Raja, Sharma S. & Poonia, R.C. (2022). Structural equation-based model on investigating the moderating effect of fear of COVID using partial least square method, Journal of Interdisciplinary Mathematics, 25:3, 703–720, DOI: 10.1080/09720502.2021.2016855

Schmid, H. (2001). Theory and Practice: Thinking styles in engineering and science. Australasian Journal of Information Systems, 5, 45–56. https://doi.org/10.3127/ajis.v9i1.218

Scott, G. S., & Bruce, R. A. (1994). Determinants of innovative behavior: A path model of individual innovation in the workplace. Academy of Management Journal, 37, 580–607. https://doi.org/10.2307/256701

Sofa, S. G., & Bruce, R. A. (1995). Decision-making style: The development and assessment of a new measure. Educational and Psychological Measurement, 55(5), 818–831. https://doi.org/10.1177/0013164495055005017

Seema, & Sachdeva, G. (2020). Moonlighting intentions of IT professionals: impact of organizational commitment and entrepreneurial motivation. Journal of Critical Reviews, 7(22), 214–220. http://dx.doi.org/10.31838/jcr.07.02.38

Seema, Choudhary, V., & Saini, G. (2021). Effect of job satisfaction on moonlighting intentions: mediating effect of organizational commitment. European Research on Management and Business Economics, 27(1), 100137. https://doi.org/10.1016/j.ired.2020.10013

Shin, G., & Kim, C. (2015). Neural correlates of cognitive style and flexible cognitive control. NeuroImage, 113, 78–85. https://doi.org/10.1016/j.neuroimage.2015.03.046

Smith, E. R., & De Coster, J. (2000). Dual-process models in social and cognitive psychology: Conceptualization and links to underlying memory systems. Personality and Social Psychology Review, 4(2), 108–131. https://doi.org/10.1002/s15327957PSPR042_01
Smith, E. S. (2004). Cognitive Style and the management of small and medium-sized enterprises. Organization Studies, 25(2), 155–181. https://doi.org/10.1177/0170840604036914

Sternberg, R. J. (2001). Allowing for thinking styles. Educational Leadership, 52(3), 36–40.

Sternberg, R.J., Wagner, R.K., Zhang, L.F. (2007). Thinking Styles Inventory—Revised II (TSI-R2) 2007. https://shareok.org/bitstream/handle/11244/9454/PonceGarcia_okstate_0664M_12191.pdf?sequence=1

Sternberg, R. J., & Zhang, L. F. (2015). Mental self-government: A theory of intellectual styles and their development. Human Development, 31(4), 197–224. https://doi.org/10.1159/000275810

Valeeva, E., Kupriyanov, R., & Romanova, G. (2017). The role of metacognitive skills in engineering education. American Society for Engineering Education 12, 67–72. https://peer.asee.org/29307.

Volodomyr, L. G., Kodja, N. A., Serhi, V. A., Eudard, V. R., & Svitlana, Y. T. (2020). Cognitive and metacognitive aspects of the development of lifelong learning competencies in law students. International Journal of Cognitive Research in Science, Engineering and Education (IJCRSEE), 8(2), 1–14. https://doi.org/10.5937/IJCRSEE20020016

Zhang, L. F. (2001). Thinking styles and cognitive development. The Journal of Genetic Psychology, 163(2), 179–195. https://doi.org/10.1080/0022132020958676

Zhang, L. F. (2002). Thinking Styles and Models of thinking: Implications for education and research. Journal Psychology, 116(3), 245–261. https://doi.org/10.1080/00223980209604153

Zhang, L. F. (2010a). Approaches and thinking styles. The Journal of Psychology, 135(5), 547–561. https://doi.org/10.1080/00223980109603718

Zhang, L. F. (2010b). Further investigating thinking styles and psychosocial development in the Chinese higher education context. Learning and Individual Differences, 20(6), 593–603. https://doi.org/10.1016/j.lindif.2010.04.011

Zhang, L. F. (2012). Thinking styles in student learning and development. The Rutledge International Handbook of Learning 6, 84–93. https://doi.org/10.4324/9780203973855.ch9