Decision-making Styles and Personality Traits

A pilot study on the predictive capacity of the TCI regarding the quality of the decision

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***Abstract* - The way individuals make choices and decisions influences their behavior and life style. The choice is not simply based on rational and formal logic, but it's influenced by many emotional and social factors. Starting from this assumption, some studies investigated the way in which emotions influence decision-making processes, while others explored the possibility that decision-making processes are compromised by the onset of psychiatric pathologies and by the presence of prefrontal cortexlesions, which can induce a radical change in basic preferences of the subject. In our opinion, the decision-making style is strictly connected to the normal personality structure while the relationship with psychopathology can be framed within the non-causal and non-linear effects typical of risk or protection factors. The present pilot study, first, intends to explore the relation between decision-making styles, non-pathological personality traits and psychic disorders; second, it intends to propose a psychometric tool administrable via mobile app, aimed at studying the influence of decision-making styles, related to personality, on the quality and effectiveness of decisions. The present pilot study, was developed in a sample of outpatients in a private psychotherapy service made up of subjects diagnosed with personality disorder. The TCI test was been administered to identify the decision-making styles related to the character traits and temperament. Through statistical analyses, five factors were extracted (5 decision-making styles) and only two personality disorders appear to be related to decision-making styles. This results describe a significant but marginal impact of decisional styles on the pathology of personality, with respect to which they play a role of risk or protection factor.**

Keyword – decision-making styles; personality traits; risk factors; protection factors; personality disorders

I. INTRODUCTION

The way individuals make choices and decisions influences their behavior and lifestyle. The processes that activate the mechanism of choice can be considered among the most interesting of the human mind [1] but only recently the researchers have begun to question themselves about the nature and characteristics of the decisional processes. Recent studies [2;3] have shown that the choice is not simply based on rational and formal logic, but it's influenced by many factors. Starting from this assumption, some studies [4][5][6] have investigated the way in which emotions influence decision-making processes, inducing preferences that deviate from rational choices [7]. Other studies [8][9], have evaluated the possibility that decision-making processes are compromised by the onset of psychiatric pathologies and by the presence of prefrontal cortex lesions, which can induce a radical change in basic preferences of the subject. In our opinion, the decision-making style is strictly connected to the normal personality structure while the relationship with psychopathology can be framed within the non-causal effects typical of risk or protective factors. Furthermore, the present study intends to contribute to the verification of this hypothesis.

II. PERSONALITY: A DETERMINING FACTOR FOR THE DETECTION OF DECISION-MAKING STYLE?

According to recent studies [10][11][12] the socio-cultural environment seems to be decisive for the elaboration of coping strategies and for decision making [13][14]. Moreover, some scholars have found that the five factors of the Big Five are related to

decisional styles [15][16][17][18][19].
Decision-making patterns are the unique and individual choice modes that come into play when a subject faces a decision task [20][21][22]. The set of these patterns defines the decisional style of the person, that is the way in which it collects information and processes it, the number of alternatives that it takes into consideration and the meanings it attributes to its decisions [23][24][25][26]. The decisional style should not be confused with personality traits, but can be described as a propensity to react specifically in a specific decision task, based on modalities learned in previous situations [27][23]. Studies on the topic recognize five common decision-making styles: rational, intuitive [28], dependent, spontaneous and avoiding [29][30][31][23].

III. Decision-making styles as risk and protection factors

A good decision can be defined as a choice that reduces the risk of feeling remorse and increases satisfaction when the subject reflects on the decision taken, even when a lot of time has passed since the decision task [32]. In addition, studies have shown that the level of satisfaction with the decision taken is an excellent indicator of the quality of decision-making processes [33]. Recent studies [34][35][36] have highlighted the existence of character determinants that can influence the quality of the decisions, exerting a negative or positive effect on the choice [37][38] [39]. An experimental survey conducted by Wood [35] explored the possible correlation between the decisional style and the personality traits identified with the Big Five. The results show that the relationship between decision-making style and personality traits is not clear, but highlights a correlation between the decision-making style and the quality of the decision taken and that the quality of the decision would seem to correlate with some personality traits, such as impulsivity and avoidance of danger. Further studies [34][40][41][42][36] have investigated the possibility that personality traits influence decision-making style. The results show that some specific personality traits, such as extroversion and awareness, have a positive effect on the quality of the decision, while others, such as impulsivity and avoidance, have a negative effect. From what has been expressed, it is clear that personality traits contribute to the development of the decision-making style and that the latter behaves as a factor of protection or risk regarding the adaptive consequences of the choice. To confirm or exclude this theoretical model it is necessary to investigate the decision making in large sections of the population and to be able to do so, the availability of adequate technological tools is essential. In this area of intervention, the present exploratory survey is inserted.

IV. Objectives of the study

The present pilot study, developed in a sample of outpatients in private psychotherapy service, intends to:

- use the TCI to identify the decision-making styles related to the character temperament traits;
- explore the relationship between decision-making styles, pathological character traits and psychic disorders.
- propose a psychometric tool administrable via mobile app, aimed at determining the influence of decision-making styles, related to personality, quality and effectiveness of decisions.

The creation of a mobile App for the collection of decision-making data finds its specific application in scientific surveys in large sections of the population.

V. Methods

A. *Instruments*

The Temperament and Character Inventory (TCI), developed by Cloninger [43], was used to evaluate personality-related decision-making styles. This is a dichotomous response questionnaire of the type True / False, composed of 240 items. The TCI performs an evaluation on seven major dimensions, in turn divided into two domains: temperament and character. Temperament is related to the biological aspects of individual, while character is considered the typical way in which individual reacts to the environment. Each dimension also includes a specific number of facets, aimed at measuring specific temperamental and character areas. The 7 dimensions mentioned are:

- **Novelty Seeking (NS)**: Strong tendency to exploration and aspects of extravagance and impulsiveness (Subscales: Exploratory excitability-**NS1**-, Impulsiveness-**NS2**-, Extravagance-**NS3**-, Disorderliness -**NS4**).
- **Harm Avoidance (HA)** : Pessimism, fear and excessive shyness (Subscales: Anticipatory worry-**HA1**-, Fear of uncertainty-**HA2**-, Shyness/Shyness with strangers-**HA3**-, Fatigability/Fatigability and asthenia-**HA4**).
- **Reward Dependence (RD)**: Sentimentalism, strong tendency to respond promptly to signs of social approval and openness to experience (Subscales: Sentimentality-**RD1**-, Attachment-**RD2**-, Dependency-**RD3**).
- **Persistence (PS)**: Industriousness, determination, ambition and extreme perfectionism.
- **Self-Directdness (SD)**: Ability to self-determination, acceptance of self and assumption of responsibility (Subscales: Responsibility Vs. Blaming-**SD1**-, Purposefulness Vs. Lack Of Goal Direction-**SD2**-, Resourcefulness Vs. Inertia-**SD3**-, Self-Acceptance Vs. Self-Striving-**SD4**-, Congruent Second Nature Vs. Incongruent Habits-**SD5**).

- **Cooperativeness (C)**: Strong empathy, compassion and availability towards the highs (Subscales: Social acceptance vs. intolerance-**C1**-, Empathy vs. social disinterest-**C2**-, Helpfulness vs. unhelpfulness-**C3**-, Compassion vs. revengefulness-**C4**-, Principles vs. self-advantage-**C5**).
- **Self-Transcendence (ST)**: The individual's sense of feeling an integral part of a universal system, defined by characteristics such as spirituality, idealism and breadth of views (Subscales: Self-forgetful vs. self-conscious experience-**ST1**-, Transpersonal identification vs. self-isolation-**ST2**-, Spiritual acceptance vs. rational materialism-**ST3**).

Below we present the studies in which our decision to use some TCI Items to investigate decision making is rooted. Alvarez-Moya et.al [44] made it clear that alterations of pulse self-regulation systems reflect a deficit in both executive functioning and decision-making [45; 46; 47]. The executive functions involve the activation of frontal and dorso-lateral areas, while the decision-making process appears to be mainly associated with the activation of the prefrontal ventro-medial cortex. Traits of personalities such as impulsivity or the search for novelty, even in their non-pathological expression, are modulated by variations in the capacity for self-regulation and sensitivity to gratification. The results of the study show that both low scores in the "excitability-exploration" and "impulsiveness" subscales, and high scores in the "novelty seeking" dimension are predictive of the choice to interrupt medical care. On the basis of the above results, the researchers concluded that the temperament aspects measured by the TCI are among the elements capable of influencing the decisional patterns. Bàlint Andò et al. [38] have hypothesized in their study that some temperamental and character traits influence the decision-making process of alcoholic subjects. In fact, the decision-making style remains stable even after many years of sobriety when the effects of alcoholism are no longer active [48]. Further research using the TCI [49][50] shows that high scores on the "impulsiveness" temperamental dimension are closely associated with substance abuse and tendency and making disadvantageous choices for one's own psychophysical wellbeing, while low scores on the "novelty seeking" dimension are related to the ability to maintain prolonged abstinence [51]. The authors considered that the psycho-biological model of Cloninger [43] about personality is very useful in the current understanding of the evolutionary aspects of decision making [52]. Finally, Hartman et al [53] with a study of a large sample of adolescents with substance use problems confirmed the predictive ability of TCI and the influence of personality traits on decision-making styles.

B. *Statistical Analyses*

To investigate the decision making in the sample under examination, 32 items specifically describing the decision-making styles were selected from eleven facets of the TCI [40] *table 1*.

TABLE 1. ITEM OF TCI CONSIDERED DESCRIPTIVE OF DECISION MAKING FUNCTION

Facet	Item
NS1	99. My reputation is to be a very practical person who does not act under the influence of emotions
	114. I usually need good practical reasons before I decide to change my old ways of doing things
	144. I hate to change my way of doing something, even when many people tell me that there is a new and better one
	191. I like trying out new ways of doing things
NS2	13. I often do things according to how I feel right now, without thinking about how they were done before
	61. I like to think about things for a long time before making a decision
	82. Usually, before making a decision, I take all facts into account in their details
	108. I hate making decisions based only on the first impression
	130. I often follow my instincts, inspiration or intuitions, without analyzing all the details
	187. I like making decisions quickly so I can start doing what is necessary
	203. I almost always take into account all the facts in their details before making a decision, even when others are asking me for a quick decision
	237. I like to read everything completely when I have to sign any paper
RD1	224. As a rule, I take time to consider whether what I am doing is right or wrong
RD4	14. I usually do things my way, rather than giving in to the wishes of others
P	37. I'm usually so determined that I keep on doing long after the others have let it go
SD1	58.My attitudes are largely determined by influences beyond my control
	121. Often circumstances force me to do things against my will
	151. Usually I'm free to choose what I want to do
	169. My actions are largely determined by influences beyond my control
SD2	30. Usually I can not do things on the basis of their priority importance, because I lack the time
	105. I have not time enough to look for long-term solutions to my problems
	177. My behavior is strongly guided by certain goals that I have placed in my life
	223. I know what I want to do in my life
SD3	40. I often wait for someone else to provide a solution to my problems
	106. I'm often not able to cope with problems because I do not know what to do
	171. I prefer to wait for someone else to take the guide to finish things
SD5	17. In most situations, my natural reactions are based on the good habits I have acquired
	207. I think that my natural reactions are usually consistent with my principles and my long-term goals
C3	10. I like working together to find a solution to problems so that everyone can benefit
	47. Usually I try to simply get what I want for myself, since it is not possible to satisfy everyone
C5	160. I do not think religious or ethical principles of right and wrong should have much influence in business decisions
ST1	96. Even after thinking for a long time about something, I learned to trust more of my feelings than of my logical

	reasoning

To define the nature of the decision patterns, the analysis of the main components with the Varimax rotation method and Kaiser normalization was performed on the 32 items extracted from the TCI.
To verify the relationship between decision-making styles and psychopathology the extracted factors were used as independent variables in an ANOVA test in which the presence of personality disorders was used as dependent variables. Statistical analyses were performed with the help of the SPSS computer system.

C. *Sample*

The study sample is made up of 1031 users of the I.S.M. (Institute of Mental Health), with an average age of 34.77 and *dvs 11.605*. The sample consists of 436 males and 576 women. Among the subjects, 27 have obtained the title of elementary diploma, 197 that of the primary school of second degree, 555 have obtained the diploma of high school diploma, 211 have obtained their degree. Concerning civil status, 543 subjects are single, 378 are married, 47 are separated and 13 are widowed; 49 subjects did not provide this information. In the sample 682 subjects are employed, 297 are unemployed and 16 retired, 36 subjects did not provide this information.

VI. RESULTS

With the PCA (Principle Component Analysis) 5 factors were extracted with correlation scores in Table 2.

- Factor 1-Rational style: based on exhaustive and complete research of information, from the consideration of all the possible alternatives and from the logical evaluation of the consequences of all the alternatives considered.
- Factor 2-Employee style: typical of people who prefer to have suggestions and advice before making choices.
- Factor 3-Avoidant style: characteristic of people who, as soon as possible, tend to avoid making decisions.
- Factor 4-Intuitive style: defined by the attention to the global aspects rather than the research and systematic processing of information and the tendency to base ones decisions on intuitions and sensations.
- Factor 5-Spontaneous style: characterized by the sensations of immediacy and by the desire to conclude the decision-making process as quickly as possible.

The 5 factors explain about 37% of the variance and each of them explains a percentage of variance between 6% and 9%.The ANOVA highlighted in table 3 shows that only two personality disorders appear to be related to decision-making styles. The analysis found:

- a significant relationship between Borderline Personality Disorder and factors 1 (rational style) and 2 (dependent style). Subjects with this disorder have lower scores at factor 1 ($F = 4.636$ $p = 0.032$) and higher scores at factor 2 ($F = 12.436$ and $p = 0.001$).

TABLE 2. PRINCIPLE COMPONENT ANALYSIS - MATRICES OF THE ROTATED COMPONENTS (C)

	C1	C2	C3	C4	C5
Item	***Rational style***	***Dependent style***	***Avoidant style***	***Intuitive style***	***Spontaneous style***
203	**0.68**	0.04	0.06	0.05	0.07
224	**0.66**	0.02	-0.03	0.08	0.02
237	**0.35**	-0.02	0.23	0.02	0.03
61	**0.69**	-0.01	-0.06	-0.06	0.02
82	**0.76**	0.04	0.09	-0.02	0.07
37	**0.42**	-0.01	-0.16	0.25	-0.23
14	-0.05	**0.53**	0.06	-0.03	0.11
58	-0.05	**0.62**	-0.06	-0.16	0.14
105	0.05	**0.50**	0.01	0.10	0.02
144	0.09	**0.34**	-0.18	0.01	0.23
121	0.03	**0.51**	-0.20	0.22	0.00
169	-0.01	**0.61**	-0.11	-0.12	0.07
96	0.10	**0.33**	-0.32	0.23	0.21
151	0.14	**-0.41**	0.12	0.29	0.35
171	0.05	0.43	**-0.47**	0.04	-0.11
177	0.19	0.38	**0.40**	0.22	-0.04
223	0.08	-0.09	**0.49**	0.26	0.03
99	0.16	0.04	**0.48**	-0.09	0.24
10	0.14	0.18	**0.53**	0.31	0.08
40	0.11	0.28	**-0.59**	0.02	0.13
106	0.14	0.28	**-0.51**	-0.01	0.04
30	0.23	-0.10	0.18	**0.50**	-0.06
130	-0.35	0.22	-0.07	**0.45**	0.32
187	-0.22	0.11	0.16	**0.48**	0.31
191	0.06	-0.10	0.11	**0.37**	0.33
17	0.31	-0.14	-0.05	**0.39**	-0.00
160	-0.11	0.15	-0.11	**0.58**	0.02
207	0.23	-0.03	0.17	**0.48**	-0.03
47	0.01	0.07	-0.01	0.00	**0.69**
108	0.12	0.16	0.07	-0.06	**0.50**
114	0.03	0.02	0.10	0.09	**0.59**
13	-0.18	0.16	-0.24	0.10	**0.53**
Total Var.	**Variance**	**Variance**	**Variance**	**Variance**	**Variance**
36.68 %	**9.049**	**8.190**	**6.738**	**6.436**	**6.264**

- a significant relationship between Avoidant Personality Disorder and factors 3 (avoidant style) and 4 (intuitive style); subjects affected by this

disorder have lower scores at both factors (F = 11.064 and p = 0.001; F = 5.026 p = 0.025).

The values of the effect size of the two personality disorders on the specific factors are between 0.007 and 0.02.

TABLE 3 - ANOVA EXTRACTED COMPONENT VS PERSONALITY DISORDER

	C1	C2	C3	C4	C5
	Rational style	***Dependent style***	***Avoidant style***	***Intuitive style***	***Spontaneous style***
BPD	F=4.636	F=12.436	NS	NS	NS
	p=0.032	*p=0.000*			
APD	NS	NS	F=11.064	F=5.026	NS
			p=0.001	*p=0.025*	

C=Component; BPD=Borderline Personality Disorder; ADP=Avoidant Personality Disorder

These values of Effect Size (ES) are very low and describe a significant but marginal impact of decisional styles on the pathology of personality and with respect to which they play a role of risk or protection factor.

VII. DISCUSSION

The results obtained by the PCA allow the detection of the presence of 5 independent components. The descriptive items of each of the factors are strongly coherent with each other from a psychological point of view. Consistent with the evidence in the literature that exclude a link between psychopathology and decision-making styles, the factors identified by the present study are significantly related exclusively to the avoidance personality disorder and borderline personality disorder, but with a rather low ES. In our opinion, this relationship does not depend on the pathological characterizations of the two dependent variables (DPB, ADP), but on the cognitive characteristics of the subjects affected by these pathologies that are closely linked to the ability of taking responsibility for the choices. These data are all the more evident when one thinks of the fact that the sample under examination from which the factors were extracted is mainly made up of subjects suffering from a personality disorder. Thus, there is a clear separation between decision making constructs and personality disorder.

VIII. COGNITIVE INFO COMMUNICATIONS: A NEW ERA FOR RESEARCH

In the previous paragraphs, we extensively discussed the need to measure peoples's decisional style and particularly the quality of their decision, using a quick and practical instrument. We have to find a synergy between the available technologies, the communication and information processes and the usable knowledge about cognitive and cerebral functions involved in the mechanism of choice. In order to achieve this goal, CogInfoCom (Cognitive Infocommunications) [54; 55] represents the ideal context to present our results and to find exactly what we need for the purpose of developing a mobile app able to interact with people and measure their decision-making styles.

IX. CONCLUSIONS AND FUTURE PERSPECTIVES

The theoretical reference construct of authors for what concerns decision making is based on the idea that decision-making styles are the product of the interaction between environmental variables and personality traits. These styles can affect the development of adaptive or unsuitable behavior in an indirect way to the extent that they interact with the affective and self-regulating processes of the subject; therefore, they behave like risk or protection factors.

The data emerging from the present study seem to support this theoretical model since the factors extracted from the PCA are derived from a personality assessment test and therefore closely related to temperament and character. Furthermore, although the study has been developed in a sample of patients there is only a weak relationship between the 5 descriptive factors of decision-making styles and psychopathological variables. The 5 factors emerged are the prerequisite for the development of a self-administered psychological test for the evaluation of decision-making styles in extended samples: this is the novelty of the present study, because, in the current scientific literature, there is only one decision-making style test [30] that measures the decisional style of some classes of workers. Through this test, the clinicians could individuate the decision making style at risk, define preventive treatment and develope adequate copying strategies. In future perspective, we intend to develope a psychometric tool that can be administered through the use of a mobile App with the specific objective of supporting research on decision making.

REFERENCES

1. M. Maldonato and S. Dell'Orco, "How to Make Decisions in An Uncertain World: Heuristics, Biases, and Risk Perception," World Futures, vol. 67, no. 8, pp. 569–577, Nov. 2011.
2. M. Maldonato and S. Dell'Orco, "Adaptive and Evolutive Algorithms: A Natural Logic for Artificial Mind," Intelligent Systems Reference Library, pp. 13–21, 2016
3. M. Maldonato and S. Dell'Orco, "The Natural Logic of Action," World Futures, vol. 69, no. 3, pp. 174–183, Jan. 2013.
4. M. P. Paulus and A. J. Yu, "Emotion and decision-making: affect-driven belief systems in anxiety and depression," Trends in Cognitive Sciences, vol. 16, no. 9, pp. 476–483, Sep. 2012.
5. E. E. Forbes, D. S. Shaw, and R. E. Dahl, "Alterations in Reward-Related Decision Making in Boys with Recent and Future Depression," Biological Psychiatry, vol. 61, no. 5, pp. 633–639, Mar. 2007.
6. F. C. Murphy, J. S. Rubinsztein, A. Michael, R. D. Rogers, T. W. Robbins, E. S. Paykel, and B. J. Sahakian, "Decision-making cognition in mania and depression," Psychological Medicine, vol. 31, no. 04, May 2001.
7. M. Maldonato and S. Dell'Orco, "Making Decisions under Uncertainty Emotions, Risk and Biases," Smart Innovation, Systems and Technologies, pp. 293–302, 2015.
8. F. Jollant, S. Guillaume, I. Jaussent, F. Bellivier, M. Leboyer, D. Castelnau, A. Malafosse, and P. Courtet, "Psychiatric diagnoses and personality traits associated with disadvantageous decision-making," European Psychiatry, vol. 22, no. 7, pp. 455–461, Oct. 2007.

9. S. Rahman, B. J. Sahakian, R. N. Cardinal, R. D. Rogers, and T. W. Robbins, "Decision making and neuropsychiatry," Trends in Cognitive Sciences, vol. 5, no. 6, pp. 271–277, Jun. 2001.
10. J.-S. Yi and S. Park, "Cross-cultural differences in decision-making styles: a study of college students in five countries," Social Behavior and Personality: an international journal, vol. 31, no. 1, pp. 35–47, Jan. 2003.
11. D. Cervone, W. G. Shadel, and S. Jencius, "Social-Cognitive Theory of Personality Assessment," Personality and Social Psychology Review, vol. 5, no. 1, pp. 33–51, Feb. 2001.
12. E.Hamarta, Üniversiteöğrencilerininyakınilişkilerindekibazıde ğişkenlerin (benliksaygısı, depresyonvesaplantılıdüşünme) bağlanmastilleriaçısındanincelenmesi (Doctoral dissertation, Selçuk Üniversitesi Sosyal Bilimler Enstitüsü), 2004.
13. E. Owie, E.O. Ademola, D. Adams, "Reality of Human Decision-Making: An Analysis. Humanities", Management, Arts, Education & the Social Sciences Journal, vol. 5 no. 2, pp. 1-4, 2017.
14. A. Dijksterhuis, "Think Different: The Merits of Unconscious Thought in Preference Development and Decision Making.," Journal of Personality and Social Psychology, vol. 87, no. 5, pp. 586–598, 2004.
15. M. Deniz, "An Investigation of Decision Making Styles and the Five-Factor Personality Traits with Respect to Attachment Styles", Educational Sciences: Theory and Practice, vol.11, no. 1, pp. 105-113, 2011.
16. P. T. Costa, R. R. McCrae, and D. A. Dye, "Facet Scales for Agreeableness and Conscientiousness: A Revision of the NEO Personality Inventory," Personality and Individual Differences, vol. 12, no. 9, pp. 887–898, 1991.
17. J. M. Digman, "Personality Structure: Emergence of the Five-Factor Model," Annual Review of Psychology, vol. 41, no. 1, pp. 417–440, Jan. 1990.
18. L. R. Goldberg, "An alternative 'description of personality': The Big-Five factor structure.," Journal of Personality and Social Psychology, vol. 59, no. 6, pp. 1216–1229, 1990.
19. C. Dewberry, M. Juanchich, and S. Narendran, "Decision-making competence in everyday life: The roles of general cognitive styles, decision-making styles and personality," Personality and Individual Differences, vol. 55, no. 7, pp. 783–788, Oct. 2013.
20. A. Oliverio and M. Maldonato, "The creative brain," 2014 5th IEEE Conference on Cognitive Infocommunications (CogInfoCom), Nov. 2014.
21. M.J. Driver, "Individual decision making and creativity", Organizational behavior, pp. 59-91, 1979.
22. V.A. Harren, "A model of career decision making for college students", Journal of vocational behavior, vol. 14, no. 2, pp. 119-133, 1979.
23. S. G. Scott and R. A. Bruce, "Decision-Making Style: The Development and Assessment of a New Measure," Educational and Psychological Measurement, vol. 55, no. 5, pp. 818–831, Oct. 1995.
24. M.J. Driver, K.R. Brousseau, and P.L. Hunsaker, "The dynamic decision maker", New York, 1990.
25. R. G. Hunt, F. J. Krzystofiak, J. R. Meindl, and A. M. Yousry, "Cognitive style and decision making," Organizational Behavior and Human Decision Processes, vol. 44, no. 3, pp. 436–453, Dec. 1989.
26. J.L. McKenney and P.G. Keen, "How managers' minds work", Harvard Business Review, vol. 52, no. 3, pp. 79-90, 1974.
27. P. Thunholm, "Decision-making style: habit, style or both?," Personality and Individual Differences, vol. 36, no. 4, pp. 931–944, Mar. 2004.
28. M. Maldonato, S. Dell'Orco, and R. Sperandeo, "When Intuitive Decisions Making, Based on Expertise, May Deliver Better Results than a Rational, Deliberate Approach," Smart Innovation, Systems and Technologies, pp. 369–377, Aug. 2017.
29. E. Gambetti, M. Fabbri, L. Bensi, and L. Tonetti, "A contribution to the Italian validation of the General Decision-making Style Inventory," Personality and Individual Differences, vol. 44, no. 4, pp. 842–852, Mar. 2008.
30. P. Iannello, and A. Antonietti, "Relations between maximizing tendencies and styles in decision-making", 2012.
31. P. Iannello, and A. Antonietti, "Relationships between decision styles and thinking styles", in Workshop on Cognition and Emotion in Economic Decision Making, pp. 49-50, Jan. 2007.
32. K. L. Milkman, D. Chugh, and M. H. Bazerman, "How Can Decision Making Be Improved?," Perspectives on Psychological Science, vol. 4, no. 4, pp. 379–383, Jul. 2009.
33. C. D. Crossley and S. Highhouse, "Relation of job search and choice process with subsequent satisfaction," Journal of Economic Psychology, vol. 26, no. 2, pp. 255–268, Apr. 2005.
34. N. Bayram, M. Aydemir, "Decision-Making and Personality Traits", in Proceedings of the International Conference on Multiple Academic Disciplines, Vietnam, 2017.
35. N.L. Wood, "Individual differences in decision-making styles as predictors of good decision making", Doctoral dissertation, Bowling Green State University, 2012.
36. M. N. Riaz, M.A. Riaz, and N. Batool, "Personality Types as Predictors of Decision Making Styles", Journal of Behavioural Sciences, vol. 22, no. 2, 2012.
37. C. Ochoa, E. M. Álvarez-Moya, E. Penelo, M. N. Aymami, M. Gómez-Peña, F. Fernández-Aranda, R. Granero, J. Vallejo-Ruiloba, J. M. Menchón, N. S. Lawrence, and S. Jiménez-Murcia, "Decision-making deficits in pathological gambling: The role of executive functions, explicit knowledge and impulsivity in relation to decisions made under ambiguity and risk," The American Journal on Addictions, vol. 22, no. 5, pp. 492–499, May 2013.
38. B. Andó, A. Must, E. Kurgyis, A. Szkaliczki, G. Drótos, S. Rózsa, P. Szikszay, S. Horváth, Z. Janka, and P. Z. Álmos, "Personality Traits and Coping Compensate for Disadvantageous Decision-making in Long-term Alcohol Abstinence," Alcohol and Alcoholism, vol. 47, no. 1, pp. 18–24, Oct. 2011.
39. M. P. Paulus, C. Rogalsky, A. Simmons, J. S. Feinstein, and M. B. Stein, "Increased activation in the right insula during risk-taking decision making is related to harm avoidance and neuroticism," NeuroImage, vol. 19, no. 4, pp. 1439–1448, Aug. 2003.
40. R.S. Bajwa, I. Batool, M. Asma, H. Ali, and A. Ajmal, "Personality Traits and Decision Making Styles among University Students (Pakistan)", Pakistan Journal of Life & Social Sciences, vol. 14, no. 1, 2016.
41. B. Ülgen, M. Sağlam, and T. Tuğsal, "Managers' personality traits over management styles and decision-making styles", International Journal of Commerce and Finance, vol. 2, no. 1, pp. 125-136, 2016.
42. Z. S. Narooi and F. Karazee, "Investigating the Relationship among Personality Traits, Decision-making Styles, and Attitude to Life (Zahedan Branch of Islamic Azad University as Case Study in Iran)," Mediterranean Journal of Social Sciences, Dec. 2015.
43. D. Garcia, N. Lester, K. M. Cloninger, and C. Robert Cloninger, "Temperament and Character Inventory (TCI)," Encyclopedia of Personality and Individual Differences, pp. 1–3, 2017.
44. E. M. Álvarez-Moya, S. Jiménez-Murcia, M. N. Aymamí, M. Gómez-Peña, R. Granero, J. Santamaría, J. M. Menchón, and F. Fernández-Aranda, "Subtyping Study of a Pathological Gamblers Sample," The Canadian Journal of Psychiatry, vol. 55, no. 8, pp. 498–506, Aug. 2010.
45. R. Sperandeo, E. Moretto, G. Baldo, S. dell' Orco, and M. Maldonato, "Executive functions and personality features: A circular interpretative paradigm," 2017 8th IEEE International Conference on Cognitive Infocommunications (CogInfoCom), Sep. 2017.
46. R. Sperandeo, A. Esposito, M. Maldonato, and S. Dell'Orco, "Analyzing Correlations Between Personality Disorders and Frontal Functions: A Pilot Study," Smart Innovation, Systems and Technologies, pp. 293–302, 2016.
47. R. Sperandeo, M. Maldonato, G. Baldo, and S. Dell'Orco, "Executive functions, temperament and character traits: A quantitative analysis of the relationship between personality and prefrontal functions," 2016 7th IEEE International Conference on Cognitive Infocommunications (CogInfoCom), Oct. 2016.
48. G. Fein and S. McGillivray, "Cognitive Performance in Long-Term Abstinent Elderly Alcoholics," Alcoholism: Clinical and

Experimental Research, vol. 31, no. 11, pp. 1788–1799, Nov. 2007.
49. M. Zuckerman, "Sensation Seeking: Behavioral Expressions and Biosocial Bases," International Encyclopedia of the Social & Behavioral Sciences, pp. 13905–13908, 2001.
50. J. B. Hittner and R. Swickert, "Sensation seeking and alcohol use: A meta-analytic review," Addictive Behaviors, vol. 31, no. 8, pp. 1383–1401, Aug. 2006.
51. P. Basiaux, "Temperament And Character Inventory (Tci) Personality Profile And Sub-Typing In Alcoholic Patients: A Controlled Study," Alcohol and Alcoholism, vol. 36, no. 6, pp. 584–587, Nov. 2001.
52. S. M. George, J. P. Connor, M. J. Gullo, and R. M. Young, "A prospective study of personality features predictive of early adolescent alcohol misuse," Personality and Individual Differences, vol. 49, no. 3, pp. 204–209, Aug. 2010.
53. C. Hartman, C. Hopfer, R. Corley, J. Hewitt and M. Stallings, "Using Cloninger's Temperament Scales to Predict Substance□Related Behaviors in Adolescents: A Prospective Longitudinal Study", The American journal on addictions, vol. 22, no. 3, pp. 246-251, 2013.
54. P. Baranyi, A. Csapo, and G. Sallai, "Cognitive Infocommunications (CogInfoCom)," 2015.
55. P. Baranyi and A. Csapo, "Definition and Synergies of Cognitive Infocommunications", ActaPolytechnicaHungarica, vol. 9, no. 1, pp. 67-83, 2012.