

## Assessment of the affective and rational bases for urgent decision-making under extreme circumstances

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In the framework of dual-type theories, decision making is based on two types of information processing: intuitive and rational. Inspired by this framework, our aims were to develop a brief self-rating measurement instrument to assess the affective and rational bases for urgent decision-making under extreme circumstances, and to study its psychometric properties. The samples comprised cadets from a military academy and participants from the general population. The results showed evidence of acceptable reliability as well as structural, convergent, and discriminant validity for the Bases for Urgent Decisions under Extreme Circumstances Inventory (BUDECI), the new 8-item inventory.

**Key words:** Decision making, Dual-theory, Test construction, Psychometric properties.

Rationality and emotion are important concepts in human psychology. To refer to these abstract concepts, ordinary people use very simple words. They use words like *head*, *brain*, *up*, or *higher* to refer to rationality, and words such as *heart*, *down*, or *lower* to refer to emotion (Cian, Krishna, & Schwarz, 2015). In addition, metaphors like “listen to your heart” and “use your head” are used by people to refer to the intervention of emotions or rationality in their decision-making (Lakoff & Johnson, 1999).

Recent studies have shown that locating the self in the heart as opposed to locating it in the brain, has relevance to various psychological phenomena (Adam, Obodaru, & Galinsky, 2015; Fetterman & Robinson, 2013). Specifically, its effects are shown on judgment and decision-making. In this sense, Fetterman and Robinson showed that participants who considered their self was in the heart took emotional decisions in scenarios of moral dilemmas, as compared to those who located it in the brain. In these scenarios, an emotional decision avoided hurting an affectively close individual, but caused serious harm to a large number of innocent individuals.

Ordinary people are not the only ones who make rational or emotional decisions. Individuals who work in high-risk environments with rapidly-evolving situations, such as police officers, military personnel, and rescue workers, along with ordinary people facing unexpected extreme

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situations, must make fast decisions. When faced with these types of situations, individuals may follow a hunch or analytically evaluate and calculate alternatives in order to decide how to respond to or behave in such circumstances.

According to Grandori (2015) decision-making must be quick, rational and reliable in activities such as first aid to victims of disasters and military or police operations, where the consequences of errors can be fatal and irreversible. This author argues that professionals working in environments involving uncertainty and risk, in which unforeseen and abnormal situations may appear, should give fast effective responses to problems that have not been previously classified and for which effective response models are not available. In other words, procedures, instructions or training manuals cannot include all situations because the rules of action of such manuals may provide the best responses to most scenarios, but may not anticipate all cases, and particularly may not include specific procedures for exceptional and unforeseen circumstances, some of which must be resolved within a short time.

Grandori (2015) has argued that the generation and testing of hypotheses occur in real time in contexts involving uncertainty and risk that require quick decisions, as compared to contexts where decisions can be taken over a longer period of time, such as in the development of scientific knowledge. Thus, rational heuristics like analogies, asking why and checking the data, or searching for counterfactual elements may be included in quick and correct decision-making. According to this author, robust action heuristics may also be used, including multiple options or solutions that depend on the circumstances and whose effects are reversible. One possible result of applying these heuristics involves responses that break or modify the rules established in instruction or training manuals, but these responses succeed in avoiding serious irreversible consequences.

Intuitively based decision-making and reflectively based decision-making are two ways of thinking when making judgments about uncertainty that are a subject of much theoretical interest in psychology (Kahneman, 2003) and its popularity has steadily increased over time (Betsch & Iannello, 2010; Evans & Stanovich, 2013). These two types of thought or information processing (Betsch, 2008) are related to the so-called dual-process or dual-type models or theories, which differentiate between two types of processing and which Stanovich (1999) has called System 1 (or Type 1, i.e., intuition) and System 2 (or Type 2, i.e., rationality).

The framework of dual-model theories includes approximately 30 theoretical versions (Fiedler & von Sydow, 2015; Frankish & Evans, 2009). In these versions of the received dual-model theory, Type 1 and Type 2 processing include opposite characteristics. Among other features, Type 1 processing is assumed to be rapid and emotional while Type 2 processing is assumed to be slow and analytic (Evans, 2012; Evans & Stanovich, 2013; Haidt, 2001; Zimmerman & Pretz, 2012).

However, Evans (2012) argues that the received versions of the dual-model theories include fallacies. One of these fallacies is that Type 1 processing leads to erroneous responses (due to cognitive biases), while Type 2 processing leads to correct responses. Another fallacy mentioned by this author, which may be associated with the great variety of definitions of the construct intuition (Epstein, 2010; a list of definitions of intuition may be seen in Dane & Pratt, 2007), is that Type 1 processing is used when the judgments are made rapidly. By contrast, this author holds that rapid judgments may correspond both to Type 1 and Type 2 processing. Furthermore, different theorists agree that correct and quick decisions may result from processing large amounts of information, even larger than the amount used in sequential processing, because of the advantage gained from parallel processing (Betsch, 2008; Eisenhardt, 1989; Evans, 2012; Grandori, 2015). However, this proposal does not oppose the idea that simple heuristics can be used in correct and quick decision-making.

According to Betsch and Iannello (2010), there are a number of measurement instruments to assess individual inclination (tendency) to decide, based on intuition or on deliberation (i.e., rationality), such as the General Decision Making Style (GDMS; Scott & Bruce, 1995), the

Rational Experiential Inventory (REI; Pacini & Epstein, 1999), and the Preference for Intuition and Deliberation (PID; Betsch, 2004). According to their authors, GDMS measures intuition and rationality, among other decision-making styles; REI measures rational and experiential (i.e., intuition) thought styles; and PID measures preference for intuition and deliberation. Measurement instruments for assessing individual differences in intuition and deliberation or similar constructs usually aim at evaluating generalized preferences across situations (Appelt, Milch, Handgraaf, & Weber, 2011; Betsch & Iannello, 2010). However, no instruments are available for specifically evaluating quick rational or emotional decision-making in extreme situations.

We define extreme situations as new, surprising and very important scenarios. Ordinary situations (e.g., buying things in a shopping mall) are qualitatively different from extreme situations (e.g., being trapped in a car in flames). Such extreme situations require quick and correct decisions that avoid serious consequences. We understand that these urgent decisions may be based on affect and rationality.

Rapid emotional or rational decisions in extreme situations are not validly evaluated by instruments that were developed for other purposes, such as evaluating decision-making in ordinary situations. By way of example, we will focus on the PID as an instrument to assess decision-making in ordinary situations. This instrument asks participants to respond to the items according to “your life in general.” Some items are “I like emotional situations, discussions, and movies” and “I am a perfectionist.” Thus, it seems apparent that the PID instructions and items present a low validity to evaluate rapid rational or emotional decision-making under extreme situations.

Firstly, we assume that the concept of rapid decisions in extreme situations is associated with the concept of generalized tendency to make decisions in ordinary situations based on Types 1 or Type 2 processing. As a result, the availability of a measurement instrument specifically developed to evaluate decision-making in extreme situations will test the hypothesis about the relationship between both concepts: rapid decision-making facing extreme situations and generalized decision-making facing ordinary situations.

Secondly, we suppose that some individuals take rational decisions and shift to emotional decisions depending on the type of situation, extreme or ordinary. For example, some individuals make rational decisions in ordinary situations (e.g., selecting the best course at a University), but emotional decisions in extreme situations (e.g., defending oneself from an unforeseen street attack). Again, we propose that the best approach to analyze this psychological phenomenon is to use an instrument to evaluate rapid decisions in extreme situations together with a scale to assess decision-making in ordinary situations. Consequently, having a specific instrument to assess decision-making in extreme situations would be useful to investigate several hypotheses of interest.

Accordingly, the practical objective of this research was to design and validate a measuring instrument based on the framework of dual-type theories in order to measure the affective and rational underpinning for fast decision-making in very important situations that arise quickly and unexpectedly, and for which the individual has no prior knowledge of how to react. This new instrument will make it possible to begin to study the theoretical relationships between urgent decisions under extreme circumstances and new variables of interest. Two studies were conducted to achieve these goals.

### **Study 1: Calibration of the new measurement instrument**

This study aimed to provide an initial pool of items to develop a measurement instrument for assessing the affective and rational bases for fast decision-making under extreme circumstances.

The final aim was to obtain an assessment instrument with a clean factorial structure (i.e., a factor structure mostly with small or few cross-loadings; Schmitt, 2011) and a pure measure of factors (Comrey & Lee, 1992). Therefore, an exploratory factor analysis (EFA) was conducted with the initial pool of items in order to explore its factorial structure and reduce the number of items to only a few but no less than three items per factor (Costello & Osborne, 2005), with Cronbach alpha reliability higher than .70 for each factor.

The data were analysed following the classical test theory approach. In order to determine the number of factors that should be extracted from the initial pool of items, a parallel analysis based on a polychoric matrix of correlations was chosen because it is a robust option to determine the number of factors in scales consisting of ordered polytomous items (Crawford et al., 2010; Holgado-Tello, Chacón-Moscoso, Barbero-García, & Vila-Abad, 2010; Lorenzo-Seva, Timmerman, & Kiers, 2011; Timmerman & Lorenzo-Seva, 2011). A polychoric correlation matrix of the initial set of items to be responded on a 7-point scale was subjected to an EFA performed with the extraction method of ordinary least squares. The factors extracted were rotated in order to foster their interpretability (Brown, 2006), and oblique rotations were conducted because not only is it frequent to find correlated dimensions in psychology (Schmitt, 2011), but empirical studies have also shown that Type 1 and Type 2 decision-making general tendencies are associated with each other (Betsch, 2004; Novak & Hoffman, 2009; Scott & Bruce, 1995). Due to the variety of oblique rotations available (Browne, 2001; Sass & Schmitt, 2010), geomin and Crawford-Ferguson (CF) quartimax rotations were performed as they provide factor structures similar to the confirmatory factor analysis (CFA) results, and this approach was meant to be used later with the scores of the new instrument. Additionally, a CF-equamax rotation was conducted because it produces larger cross-loadings, and it was suggested for the development of new scales (Schmitt & Sass, 2011). Finally, the results of the different rotation methods were analysed.

## Method

### *Participants*

Sample 1 was a convenience sample of 190 male university students from Argentina with a mean age of 22.0 years ( $SD=2.4$ , age range: 17 [one participant] to 29) who were attending classes from first to fourth years at a military academy ( $n_s=50, 45, 47, 48$ , respectively). The authorities of the military academy allowed us to carry out this research in the military institution. This permission included the approval of ethical issues of this study. The individuals were recruited by military personnel. The military students gave their free and informed consent for their participation after they were informed about the research objectives. The participants have not received any compensation for responding to inventories.

### *Materials and procedures*

*Items description.* The items were developed in a theory-driven way (Burisch, 1984). Consequently, several items were inspired by the dual-type models of information processing (and its measurement instruments) and by the naturalistic idea of following one's *heart* (i.e., affect, Type 1 processing) or one's *head* (i.e., rationality, Type 2 processing) for decision-making. The rationale behind this strategy was to subsequently reduce the number of items to an acceptable minimum, by conducting a factor analysis (Costello & Osborne, 2005). All the items were written in Argentinean Spanish and they inquired into how the participants would make their decisions

(i.e., whether guided by affect or rationality). A pool of 14 items, in a paper-and-pencil format, was provided to participants, who were instructed to indicate the degree of agreement with each item (see Table 1). A sample item from decision making based on affection is “what my heart dictates” (“lo que dicta mi corazón,” in Argentinean Spanish). A sample item from decision making based on rationality is “evaluating pros and cons” (“evaluar pros y contras,” in Argentinean Spanish). Responses were given on a scale rating from 1 (*totally false*) to 7 (*totally true*).

Table 1

*Factor loadings for exploratory factor analysis with several rotations of initial item pool*

Item	Factor 1			Factor 2		
	G	Q	E	G	Q	E
Lo que me dicta el corazón	.84	.84	.83	-.05	-.05	-.07
Lo que diga mi corazón	.77	.77	.77	-.07	-.07	-.09
Una corazonada	.71	.70	.70	-.02	-.03	-.05
Lo que siento en mi alma	.69	.69	.68	.10	.10	.08
Lo que el cuerpo me “marca”	.46	.46	.46	-.10	-.10	-.11
Lo que siento visceralmente	.45	.44	.44	.05	.05	.04
Mi primera reacción afectiva	.39	.39	.38	.00	.00	-.01
Evaluar pros y contras	.03	.01	.00	.84	.83	.83
El procesamiento de la información	-.09	-.11	-.12	.79	.79	.79
La planificación	.01	-.01	-.01	.69	.69	.69
El cálculo de las probabilidades	.04	.03	.02	.67	.67	.67
Lo que proceso conscientemente	-.09	-.10	-.11	.61	.61	.61
Lo que evaluó conscientemente	-.20	-.21	-.22	.61	.61	.61
Mis razones	.23	.22	.22	.50	.50	.49

*Note.* Factor loadings >.63 and items selected for Bases for Urgent Decisions under Extreme Circumstances Inventory are in boldface, G=Geomin rotation, Q=Crawford-Ferguson (CF) quartimax rotation, E=CF-equamax rotation, Factor 1=Affective Urgent Decision, Factor 2=Rational Urgent Decision.

*Procedure.* The participants responded to the inventories in group sessions. In order for the participants to understand the characteristics of the extreme situations, written instructions in Argentinean Spanish were supplied before the presentation of the items. The respondents were instructed to think about a putative extreme situation in which they must make a very fast decision (i.e., in less than one second). The participants were told that an extreme situation included the following characteristics: they are completely new, fully unexpected, and very important (possibly a life-or-death situation). Directions asked the participants to imagine that they were in an extreme situation – not in the sense of a specific situation but rather a general one with the characteristics mentioned above – and to respond also in a general way, by stating what they would prefer to do in this type of situation. Finally, directions asked the participants to imagine that they respond to the urgent situation in less than a second so that they would clearly understand that the response should be very fast. Following the presentation of instructions, the items were presented in a paper and pencil format. Participants reported demographic data, such as sex and age.

## Results

The Kaiser-Meyer-Olkin (KMO) test was 0.80 and the Bartlett’s statistic ( $df=91$ ) was 986,  $p<.001$ . The results of the parallel analysis based on minimum rank factor analysis (Timmerman

& Lorenzo-Seva, 2011) implemented on polychoric correlation matrices suggested retaining two factors (eigenvalues 3.97 and 2.69; proportion of explained variance based on eigenvalues, .28 and .19, respectively). The three oblique rotations were analysed. Items that loaded on each factor were the same in all the rotations (see Table 1). We only retained items with an item-to-factor loading on a specific factor that could be classified as excellent (loadings  $>.71$ ) or very good (loadings  $>.63$ ) according to the Comrey and Lee (1992) guidelines, so as to achieve a more definitive and pure measure of factors (Pett, Lackey, & Sullivan, 2003; Tabachnick & Fidell, 2006).

The retained items loaded lower than  $|.13|$  onto the other factor, indicating no salient cross-loadings (Brown, 2006; Costello & Osborne, 2005; Tabachnick & Fidell, 2006). Consequently, Factor 1 (Cronbach alpha=.82) and Factor 2 (Cronbach alpha=.82) were composed of 4 items, respectively.

Regarding item content, it was observed that Factor 1 captured the concept of urgent decision-making based on affect under extreme circumstances (i.e., Type 1 processing), named *affective urgent decision*. Factor 2 captured the concept of urgent decision-making based on rationality under extreme circumstances (i.e., Type 2 processing), named *rational urgent decision*. These two factors or dimensions were of substantial theoretical interest because they were consistent with the framework of the dual-type models of decision making.

The measurement instrument was named *Bases for Urgent Decisions under Extreme Circumstances Inventory* (BUDECI). The Argentinean Spanish items were translated into English by a professional translator and reviewed by the authors. BUDECI includes the following items corresponding to affective urgent decisions were *whatever my heart tells me, what I feel in my soul, what my heart dictates, a hunch*, whereas items representing the rational urgent decisions were *planning, evaluating pros and cons, information processing, calculating probabilities* (items were translated from Argentinean Spanish to English; for original items see Table 1).

## Study 2: Validity of the BUDECI

The aims of this study were to analyse the psychometric properties, to test the two-factor model by means of a CFA, and to determine the face, convergent and discriminant validity of the BUDECI. With respect to the CFA, we expected to confirm the presence of two factors, one corresponding to urgent affective decisions and the other one corresponding to urgent rational decisions under extreme circumstances. About face validity, we expected some psychologists who were doing psychological research to classify each item in the proper dimension. Regarding convergent validity, the most important hypothesis was that the tendency towards urgent affective decisions under extreme situations was positively associated with the general tendency towards intuitive (i.e., emotional) decisions in ordinary situations and that the tendency towards urgent rational decisions under extreme situations was positively associated with the general tendency towards reflective decisions in ordinary situation. Regarding discriminant validity, the Big Five model is associated with measures of generalized reasoning dispositions. A meta-analysis showed the confidence intervals of the correlations of intuition and rationality with the Big Five, and showed that, in general, both decision-making tendencies are positively associated with four of the factors of the Big Five, respectively, but not with emotional stability (Wang, Highhouse, Lake, Petersen, & Rada, 2015). According to the same study, intuition tends to have higher correlations with extraversion, while rationality tends to have higher correlations with conscientiousness and openness. Therefore, given that the general tendencies to make intuitive and reflective decisions

are associated with the Big Five personality traits, we expected the BUDECI to be related to the Big Five.

## Method

### *Participants*

Sample 2 was a convenience sample of the general population from Argentina consisting of 240 participants (120 women) with a mean age of 39.2 years ( $SD=14.7$ , age range: 17 [one participant] to 89). Respondents did not receive any compensation for their participation. The “snowball” sampling technique was used for data collecting. Undergraduate students of Psychology received academic credits for incorporating participants into this sample. Individuals gave their free and informed consent for their participation after they were informed about the study objectives. The individuals have not received any form of compensation for their participation.

### *Materials and procedures*

The assessment instruments included in this study are presented below.

*BUDECI.* It is the new 8-item self-report measurement instrument developed by the authors to assess urgent decision making under extreme circumstances. The BUDECI evaluates two factors concerning the bases for decision making in new, unexpected and very important situations. The *affective urgent decision* factor is characterized by subjective reaction related mainly to the emotional/affective state of the individual. In contrast, the *rational urgent decision* factor is characterized by cognitive processing of information, which includes weighing pros and cons, calculating probabilities, and planning responses, among other processes. This instrument includes written directions before presenting the items (see Procedure section of Study 1). We used the BUDECI Argentinean Spanish version.

*Adjective Checklist for Personality Assessment (AEP).* The Argentinean Spanish AEP version (Ledesma, Sánchez, & Díaz-Lázaro, 2011) is a 67-item measurement instrument for assessing the Big Five personality model including agreeableness, conscientiousness, neuroticism, extraversion, and openness to experience factors. The items consisted of adjectives associated with each Big Five factor. The respondents indicated the degree of self-description of each personality adjective by means of a 5-point scale ranging from 1 (*does not describe me at all*) to 5 (*totally describes me*). In our sample, the Cronbach alpha internal consistencies were .86 for agreeableness (16 items), .86 for conscientiousness (13 items), .85 for neuroticism (18 items), .79 for extraversion (10 items), and .68 for openness (10 items).

*Preference for Intuition and Deliberation.* The PID (Betsch, 2004) is a measure of the individual inclination to the basic modes of decision-making (Betsch & Kunz, 2008) based on intuition (i.e., Type 1 processing), or on cognition (i.e., deliberation, Type 2 processing; Betsch & Kunz, 2008; Betsch & Iannello, 2010). The PID conceptual definition of intuition is decision-making based on affect, and deliberation is defined as decision making based on cognition (Betsch, 2008). Both PID factors are negatively associated and a model of two correlated factors provided the best fit to the data (Betsch, 2004). In the development of PID, other previous similar instruments, particularly REI (Raffaldi, Iannello, Vittani, & Antonietti, 2012), were taken into account. PID and REI are strongly associated with one another, in such a way that the preference scale for

intuition of PID and the experiential scale of REI can be used interchangeably (Witteman, van den Bercken, Claes, & Godoy, 2009). We used an Argentinean Spanish adaptation of PID (Cosentino & Azzollini, 2014) consisting of 8 items to measure preference for intuition and 8 items to measure preference for deliberation. The items consist of positive statements, and the participants must indicate their agreement using a 5-point scale ranging from 1 (*I very much disagree*) to 5 (*I very much agree*). In this research, internal consistencies for the PID were Cronbach alpha=.85 for deliberation preference, and Cronbach alpha=.82 for intuition preference.

*Procedure.* Participants individually responded to the instruments. The administration order was: BUDECI, PID, AES. Finally, participants reported demographic data, such as sex and age.

## Results

### *Descriptive statistics and reliability*

The internal consistencies of the BUDECI were acceptable for both scales, and these scales negatively correlated with each other (see Table 2). The mean score for the affective urgent decision scale was 17.2,  $SD=6.2$ , and the mean score for the rational urgent decision scale was 16.2,  $SD=6.3$ . Men scored higher than women did on the rational urgent decision factor,  $t(238)=3.19, p=.002$ .

Table 2

*Correlations among both factors of the BUDECI and a series of relevant variables*

Scale	BUDECI affective	BUDECI rational
BUDECI affective	(.87)	
BUDECI rational	-.50***	(.88)
PID Intuition	.49***	.23***
PID Deliberation	-.25***	.48***
AEP Conscientiousness	-.24***	.27***
AEP Neuroticism	.22***	-.15*
AEP Openness	.13*	-.20**
AEP Extraversion	.13*	-.17*
AEP Agreeableness	.08	.01

*Note.* BUDECI=Bases for Urgent Decisions under Extreme Circumstances Inventory, affective=affective urgent decisions factor, rational=rational urgent decisions factor, PID=Preference for Intuition and Deliberation, AEP=Adjective Checklist for Personality Assessment; \* $p<.05$ , \*\* $p<.01$ , \*\*\* $p<.001$ .

### *CFA of BUDECI*

For the purposes of assessing the two-factor model, a polychoric correlation was used with diagonally weighted least squares (DWLS) to estimate the CFA of the BUDECI items, which had been responded to in an ordered categorical scale (Yang-Wallentin, Jöreskog, & Luo, 2010). Due to the small sample size, we included the Satorra-Bentler chi-square statistic to test model fit (Jöreskog, 2005). A series of fit indices were considered (Schweizer, 2010). The CFA results for the BUDECI were Satorra-Bentler  $\chi^2(19)=21.97, ns$ ; normed S-B  $\chi^2=1.15$ ; TLI=.994; CFI=.996; and RMSEA=.07. The previous results were interpreted as a good model fit of the data for the BUDECI, which consisted of the affective urgent decision factor and the rational urgent decision factor as found in the EFA.



### *Face validity*

The face validity of BUDECI items was evaluated by 11 independent judges (8 women, 3 men) who conduct psychological research. We asked the judges to categorize each of the BUDECI items on one of two dimensions: affective or rational urgent decision-making. Each judge correctly classified all the BUDECI items in the proper dimension.

### *Convergent and discriminant validity*

For the purposes of assessing convergent and discriminant validity, the associations with scores from the theoretically relevant inventories were analysed. In general, the associative hypotheses were confirmed for urgent decisions and generalized preference variables for decision-making and the Big Five personality model (see Table 2). Firstly, taking into account that the BUDECI assesses the affective and rational bases for urgent decision-making under extreme circumstances, the scores of the affective urgent decision factor and the scores of the rational urgent decision factor were positively associated with the scores of PID tendency to intuition and the scores of PID tendency to deliberation, respectively. Secondly, on the whole, the affective urgent decision and rational urgent decision factors were associated with the Big Five factors similarly to the way the Big Five factors were associated with the generalized disposition to intuition and to rationality (Wang et al., 2015). However, it is noteworthy that other associations were found between urgent decisions and the Big Five. Specifically, the affective urgent decision factor was found to be negatively associated with the conscientiousness factor, whereas the rational urgent decision factor was found to be negatively associated with openness to experience and extraversion.

## **Discussion**

This study presents the development of a self-report measure for assessing the affective and rational bases for urgent decision making under extreme circumstances. It also provides evidence of acceptable reliability, and structural, face, convergent, and divergent validity for the BUDECI. The bases for the decision-making construct applied to this study rely on two dimensions: the affective urgent decisions and the rational urgent decisions. With respect to the aforementioned dimensions, an EFA on an initial pool of items yielded a two-factor structure; and a subsequent CFA on BUDECI scores from another sample yielded the same structure.

The BUDECI is based on the framework of dual-process or dual-type models or theories (Evans & Stanovich, 2013). This previous framework differentiates between two types of processing: Type 1 (i.e., intuition) and Type 2 (i.e., reflection/deliberation). The affective urgent decision factor is associated with Type 1 processing, and the rational urgent decision factor is related to Type 2 processing.

The two factors, affective and rational urgent decisions, were found to be associated with each other. This result was expectable because the association between the generalized dispositions to intuition and reflection has been reported in the literature on judgment and decision making (Betsch, 2004; Novak & Hoffman, 2009; Scott & Bruce, 1995).

The correlations between the urgent decision factors and each of the relevant variables always presented the opposite sign, that is, if a BUDECI factor was positively correlated with one of the relevant variables, the other factor was negatively correlated. In short, the association of the BUDECI factors with the relevant variables showed exactly the reverse sign.

The BUDECI factors predict the generalized preference for intuition and for deliberation. The affectively based urgent decision making under extreme circumstances was positively associated with preference for intuition, but negatively related to preference for deliberation. By contrast, the rationally based urgent decision making under extreme circumstances was positively related to preference for deliberation, but negatively related to preference for intuition.

The BUDECI factors are associated with the Big Five. The affective urgent decision factor was positively associated with neuroticism, openness to experience, and extraversion, and negatively associated with conscientiousness. Conversely, the rational urgent decision factor was positively associated with conscientiousness, and negatively associated with neuroticism, openness to experience, and extraversion. Finally, the differences in the associations between urgent decisions and the Big Five and between generalized decision making tendencies and the Big Five (Wang et al., 2015) support the notion that the construct urgent decision making under extreme circumstances and the construct generalized preference for decision making are different from each other. In this sense, these differences show that the hypothesized need for an instrument to measure urgent decisions is well-founded.

It may be concluded that the BUDECI is an instrument for measuring the construct bases for urgent decision making under extreme conditions, and that it has adequate psychometric properties.

## **Limitations**

An important and noteworthy limitation for the validation of the new instrument was the lack of a published psychometric study on a reliable and valid measuring instruments adapted to the Argentine population for assessing Types 1 and 2 processing. Therefore, for practical reasons the PID was selected for this research: It is a measuring instrument that evaluates the tendency towards Types 1 and 2 processing, which has been adapted to the population and has good psychometric properties. Undoubtedly, it would also have been interesting for us to use adapted measurements such as the Situation-Specific Thinking Style (SSTS; Novak & Hoffman, 2009), the GDMS (Scott & Bruce, 1995), the REI (Pacini & Epstein, 1999), when they become available in Argentina, so as to be able to validate the new scale.

## **Future studies**

We consider it important to focus on the nomological network of the BUDECI factors, in order to determine whether they are associated with other types of decision making, intelligence, or working memory.

Although the results of this study showed that the BUDECI is a reliable and valid scale, several studies could be performed to continue exploring its psychometric properties. For example, it would be relevant to conduct a multiple-group confirmatory factor analysis across groups in order to study the measurement invariance of this new scale.

To conclude, although the aim of developing the BUDECI was to design a short inventory, we consider that the same dimensions could be measured by an instrument with a larger number of items to be administered in research settings where there were no time constraints for data collection, and where a higher level of accuracy and attention to detail may be considered useful.

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No âmbito de teorias duales, a tomada de decisões baseia-se em dois tipos de processamento de informações: intuitivo e racional. Inspirados por este marco conceitual, nossos objetivos foram desenvolver um breve instrumento de medição de autoavaliação para avaliar as bases afetivas e racionais para a tomada de decisões urgentes em circunstâncias extremas e estudar suas propriedades psicométricas. As amostras incluíram cadetes de uma academia militar e participantes da população em geral. Os resultados mostraram evidências de confiabilidade aceitável, bem como validade estrutural, convergente e discriminante para as inventário Bases for Urgent Decisions under Extreme

Circumstances inventory (BUDECI; Bases para Decisões Urgentes em Circunstâncias Extremas, em português), o novo inventário de 8 itens.

**Palavras-chave:** Tomada de decisão, Teorias duales, Construção de testes, Propriedades psicométricas.

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