

Original article

# A French adaptation of the internal and external encoding style questionnaire and its relationships with impulsivity

## Une adaptation française du questionnaire de style d'encodage interne et externe et ses liens avec l'impulsivité

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### Abstract

Recent research has revealed the existence of individual differences in how preexisting schemata (versus cues from the outside world) affect encoding processes, which can be reliably assessed with the internal and external encoding style questionnaire (ESQ) [Lewicki, P. Internal and External Encoding Style and Social Motivation. In: J. P. Forgas, K. D. Williams, S. M. Laham, (Eds.), *Social Motivation: Conscious and Unconscious Processes*. Psychology Press, New York (2005). pp. 194–209]. The present study was designed to (1) test the psychometric properties of a French version of the ESQ and (2) explore in-depth its relationship with impulsivity – a trait of central importance in the understanding of emotional psychopathology, and which has been previously related to the internal encoding style. Sixty-three participants were tested using the French versions of the ESQ and the UPPS impulsive behavior scale. The UPPS identifies four distinct facets of impulsivity: urgency, lack of premeditation, lack of perseverance, and sensation seeking. The results showed (1) that the French version of the ESQ has good psychometric properties and (2) that consistent with theoretical considerations, internal encoding style is related to two specific out of the four components of impulsivity: high urgency and low perseverance.

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### Résumé

Des études récentes ont montré l'existence de différences individuelles dans la façon dont les personnes encodent des informations en se basant sur des schémas préexistants (versus des indices issus de l'environnement). Ces différences individuelles peuvent être mesurées par le biais d'une échelle autoévaluée : le questionnaire de style d'encodage interne et externe [Lewicki, P. Internal and External Encoding Style and Social Motivation. In: J. P. Forgas, K. D. Williams, S. M. Laham, (Eds.), *Social Motivation: Conscious and Unconscious Processes*. Psychology Press, New York (2005). pp. 194–209]. Les objectifs de cette étude sont (1) de valider une version française de l'ESQ et (2) d'analyser les relations entre le style d'encodage et l'impulsivité ; des liens entre un style d'encodage interne et une haute impulsivité ayant déjà été rapporté dans la littérature. Dans ce but, 63 participants ont rempli les versions françaises de l'ESQ et du questionnaire UPPS d'impulsivité. Le questionnaire UPPS mesure quatre facettes distinctes de l'impulsivité, à savoir l'urgence, le manque de préméditation, le manque de persévérance et la recherche de sensation. Les résultats de cette étude indiquent (1) que la version française de l'ESQ a de bonnes propriétés psychométriques et (2) qu'un style d'encodage interne est associé à une haute urgence et à une basse persévérance.

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**Keywords:** Internal and external encoding; Encoding style; Impulsivity; UPPS; Confirmatory factor analysis

**Mots clés :** Encodage interne et externe ; Style d'encodage ; Impulsivité ; UPPS ; Analyse factorielle confirmatoire

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## 1. Introduction

It is well-known since William James formulated his General Law of Perception (James, 1890), that the result of every act of perception is a combination of the objective external data (what “comes through our senses” in James’ words) and the internal (subjective), interpretive schemata (what “comes out of our mind,” as he put it). Recent research has revealed the existence of individual differences in how these preexisting, internal schemata (versus external cues from the outside world) affect encoding processes. These differences relate to how “hasty” (or “internal”, i.e. based on internal encoding categories) versus “conservative” (or “external”, i.e. based on data from external stimuli) the encoding processes are (Lewicki, 2005). This hypothesized encoding style can be interpreted in terms of the validation threshold for instantiation of schemata, which is the relative amount of supportive evidence a perceiver needs to collect before imposing an interpretative category (schema) on a stimulus. When stimuli are ambiguous, encoding algorithms may nonconsciously impose on them preexisting interpretative categories even if the stimuli objectively do not match very well those categories (Lewicki et al., 1989). Research indicates that the more internal the style of encoding, the greater the probability that the environment cues will be interpreted in terms of preexisting (internal) encoding categories, thus providing support for those categories and contributing to their reinforcement through the process of “self-perpetuation” (Lewicki, 2005; Lewicki et al., 1992).

While this style of encoding appears to represent a meaningful individual difference, it would be impractical to diagnose it in an individual by assessing the threshold of his/her instantiation of schemata directly, as it would require using some laboratory experimental methods such as tachistoscopic presentation of stimuli and measurements of stimulus onset asynchrony (SOA).

Recently, a new scale was constructed in order to more easily identify the location of a person on the continuum of encoding style: the encoding style questionnaire (ESQ) (Lewicki, 2005). This questionnaire is based on the assumption that the threshold of instantiation of schemata should determine the probability, and therefore, the frequency of experiencing the commonly observed phenomenon of “split-second illusions” and includes simple questions about the frequency of having such “split-second illusions” experiences in everyday life (e.g., recognizing erroneously an animal running across the road before finding out a moment later that it was a piece of paper moved by the wind). Indeed, because internal encoders are more likely to more “hastily” impose imperfect or even wrong encoding schemata, they should experience split-second illusions more frequently when identifying certain known objects or phenomena.

Lewicki (2005) and his colleagues have conducted a series of studies to investigate the relationship between encoding style as measured using the ESQ and objective cognitive performance measures. Results demonstrate that, as expected, internal encoders are more accurate than external encoders when exposed to tachistoscopic presentations of images of everyday objects or incomplete displays of letters and asked to recognize them,

which is consistent with the notion that they exhibit a lower threshold of instantiation of interpretive schemata in the process of encoding (external encoders more often say that they “cannot see anything”). In another study, internal encoders showed more self-perpetuation of newly acquired encoding algorithms, as predicted from the fact that their threshold of instantiation of schemata is lower, which should facilitate the rate of self-perpetuation (Lewicki, 2005; Lewicki et al., 1989, for examples of procedures used in research on self-perpetuation).

Reporting frequent experience of split-second illusions in ESQ does not appear to be significantly affected by a response set or social pressure factors, as no correlations were found between ESQ and the social desirability scale (Marlow–Crown) and lie scores from various tools, or a standard set of biographical data (socioeconomic status, education, and family structure; some studies showed only a trend indicating that females experience more split-second illusion). No correlations were found with IQ (as measured by Wechsler test and raven progressive matrices). Also, no correlations were found with field dependence (Witkin and Goodenough, 1981), and need for cognitive closure (Webster and Kruglanski, 1994).

In addition, in-depth case studies were conducted to investigate the personality profiles of “extremely internal” versus “extremely external” subjects (as assessed by structured interviews and the NEO-PI-R, Costa and McCrae, 1992). Interestingly, it appeared that internal encoders had higher score in the openness and neuroticism domains. More specifically, internal encoders had higher scores on the “fantasy” and “feelings” subscales of the openness domain and higher scores on the “depression”, “anxiety”, and “impulsiveness” subscales of the neuroticism domain. These case study based data suggest that internal and external encoders have distinctively different cognitive approaches to “reality,” with each style having its strengths and weaknesses (that is not to imply a dichotomy – the encoding style represents a clear continuum). For example, the internal style may facilitate various forms of artistic creativity but at the expense of a risk of potentially losing “touch with reality” and even a proneness to develop dysfunctional encoding dispositions (and psychopathological states). In this respect, the high rating on the impulsiveness subscale of the NEO-PI-R found in extremely internal encoders is of particular interest, as the concept of impulsivity plays a prominent role in the comprehension and diagnosis of various forms of emotional psychopathology (Moeller et al., 2001, for a review).

Impulsivity is generally considered to be a multifaceted construct that consists of a number of interrelated but still different component dimensions (Evenden, 1999). From this perspective, Whiteside and Lynam (2001) have clarified the construct of impulsivity by identifying four separate components associated with impulsive behaviors. These four facets of impulsivity, which are the basis of a scale called the UPPS impulsive behavior scale (Whiteside and Lynam, 2001), are:

- urgency, defined as the tendency to experience strong reactions, frequently under conditions of negative affect;
- premeditation, defined as the tendency to think and reflect on the consequences of an act before engaging in that act;

- perseverance, defined as the ability to remain focused on a task that may be boring and/or difficult;
- sensation seeking, considered as a tendency to enjoy and pursue activities that are exciting, and openness to trying new experiences.

The purpose of the present study was:

- to evaluate the psychometric properties of the French version of the internal and external ESQ;
- to explore further the relationship between encoding style and the construct of impulsivity, by investigating specific associations with its various facets (as they differ in their relevance to the concept of encoding style).

## 2. Materials and methods

### 2.1. Participants and procedure

A total of 83 undergraduate psychology students took part in the study. All participants were tested using the French versions of the internal and external ESQ (Lewicki, 2005) and the UPPS impulsive behavior scale (Van der Linden et al., 2006a). The questionnaires were administered in-group sessions, in conditions that guaranteed anonymity. Because both instruments assume that participants are capable of understanding precisely the subtle meaning of the questions, only data from native French speakers were retained, and our final sample consisted of 63 participants (58 women, 4 men, and one participant who did not specify gender). The mean age of the sample was 21.6 years (S.D. = 3.15) and the mean number of years of education was 13.9 (S.D. = 1.17); age and education did not correlate with any variables in the study.

### 2.2. Questionnaires

#### 2.2.1. Internal and external ESQ

The French ESQ consisted of 21 items translated into French from the English original version of the ESQ (Lewicki, 2005). The French ESQ was developed as follows:

- the first and the last author of this study, with the help of an English–French bilingual, translated the 21 items of the original ESQ into French;
- another English–French translator translated the French version back into English;
- all discrepancies identified between the original ESQ and the back-translation were discussed with the third author (who has developed the original ESQ) until a satisfactory solution was found.

Only six items (number 5, 8, 11, 15, 18, and 21) are diagnostic items; the remaining 15 items are included to disguise the focus of the test. Representative diagnostic items include, “For a split-second from a distance, I sometimes mistake strangers for people I know” or “Sometimes when I’m driving, I see a piece of paper or a leaf being moved by the wind, and for a split of second think

that it might be an animal (e.g., a squirrel or a cat)”. Participants respond to each item using a six-point Likert-scale, ranging from 1 = “Strongly disagree” to 6 = “Strongly agree”. A high score on the ESQ reflects an internal encoding style, whereas a low score reflects an external encoding style.

#### 2.2.2. UPPS impulsive behavior scale (UPPS)

The French version of the UPPS (Van der Linden et al., 2006a, for information about the development of the French UPPS and an investigation of its psychometrical properties), translated from Whiteside and Lynam (2001), consists of 45 items that pertain to the four different facets of impulsivity, labeled *urgency* (12 items, e.g., “When I feel bad, I will often do things I later regret in order to make myself feel better now”), (lack of) *premeditation* (11 items, e.g., “I am a cautious person”), (lack of) *perseverance* (10 items, e.g., “I concentrate easily”), and *sensation seeking* (12 items, e.g., “I will try anything once”). Participants respond using a four-point scale from 1 = “I agree strongly” to 4 = “I disagree strongly”. This questionnaire is widely used in research and has been shown to possess good psychometric properties in clinical and nonclinical samples.

## 3. Results

The results section is divided into two parts: psychometric properties of ESQ, and its relation to the components of impulsivity.

First, the psychometric properties of the ESQ were analysed using exploratory and confirmatory factor analyses. The number of factors to extract was determined by a Velicer’s minimum average partial (MAP) test performed on the correlation matrix (O’Connor, 2000; Velicer, 1976). The MAP test is useful because it provides the optimal number of factors to retain. Then, the covariance matrix was analyzed with an exploratory factor analysis, and finally, confirmatory analyses were computed with Mplus (Munthén and Munthén, 2006). For this latter analysis, goodness-of-fit was tested with chi-square (a non-significant value corresponds to an acceptable fit). In addition to the chi-square, two other indices that depend on a conventional cut-off have also been computed: the root mean square error of approximation (RMSEA) and the standardized root mean square residual (SRMR). The combination of these two indices is particularly meaningful because the RMSEA is sensitive to the misspecification of the factor loadings while the SRMR is sensitive to the misspecification of the factor covariances. Many authors have used the comparative fit index (CFI) in confirmatory factor analyses and we also report this index for compatibility with previous studies. Hu and Bentler (1999) recommended values of RMSEA below 0.06, SRMR below 0.08, and CFI above 0.95. A CFA comparison of males and females was not conducted because of the small number of males and the imbalance between males and females in the sample.

Second, correlation analysis was performed to test the hypothesized relationships between internal and external encoding style and the four facets of impulsivity. According to Cohen (1988), a correlation between 0.10 and 0.30 represents a small

effect, a correlation between 0.30 and 0.50 – a medium effect, and above 0.50 – a large effect. Confirming or rejecting hypotheses based on  $p$ -value has been shown to be problematic because  $p$ -value depends on both effect sizes and sample size. Thus, following suggestions by several authors (Schmidt, 1996), effect sizes were reported within 95% confident interval (CI) and used in the interpretation of the results.

### 3.1. Psychometric properties of the French ESQ

Of the 63 participants, only one participant had a missing data on the ESQ. A MAP test (Velicer, 1976) recommended extracting only one factor. A factor analysis was then performed. The maximum loading of each item was greater than 0.50, and the factor analysis explained 48.16% of the total variance.

The ESQ was then submitted to a confirmatory factor analysis using maximum likelihood (ML) estimation. Initial examination of the distributions of the variables indicated that none of them departed from normality. The  $\chi^2$  statistic of the model was significant,  $\chi^2(9) = 28.85$ ,  $p < 0.001$ . The maximum modification indices in the  $\theta - \Delta$  matrix (covariance between errors on observed variables) were found between items 8 and 11. Thus, we chose to let the errors of these two items covary because they are semantically very similar (item 8: “Sometimes when I’m driving, I see a piece of paper or a leaf moved by the wind, and for a split of second think it might be an animal”; item 11: “When I’m on a walk, I sometimes see a rock or piece of wood and for a split-second mistake it for something else (or have similar experience in other conditions)”). The  $\chi^2$  of this new model was nonsignificant,  $\chi^2(8) = 4.32$ ,  $p = 0.83$ . For the fit indices, we obtained a RMSEA = 0.000 and a SRMR = 0.04. The CFI is equal to 1.00. Their combination indicated an excellent fit.

### 3.2. Relationships between encoding style and the four facets of impulsivity

Means, standard deviations and internal validity of the ESQ and the UPPS are reported in Table 1. Of the 63 participants, eight had one missing value. Missing values were replaced by the mean obtained by the subject on the scale to which the missing value belonged. This imputation method is recommended when a scale has an  $\alpha$  greater than 0.70 (Schafer and Graham, 2002). Scores for the ESQ and the four subscales of the UPPS are normally distributed.

Pearson correlations were then computed between the ESQ and the four facets of the UPPS. Correlation analysis revealed a

positive correlation between the ESQ and both urgency,  $r = 0.35$ ,  $CI = (0.11, 0.57)$ , and lack of perseverance,  $r = 0.27$ ,  $CI = (0.03, 0.49)$ . Thus, internal encoders had higher urgency and lower perseverance than external encoders. No significant relationship was found between the ESQ and the two remaining facets of the UPPS, namely, the lack of premeditation,  $r = 0.18$ ,  $CI = (-0.01, 0.41)$ , and sensation seeking,  $r = -0.09$ ,  $CI = (-0.33, 0.16)$ .

## 4. Discussion

The main purpose of this study was (1) to validate a French version of the ESQ, and (2) to investigate its relationships with the multifaceted construct of impulsivity. Confirmatory factor analysis revealed that the French version of the ESQ has good psychometric properties. Moreover, scores on the ESQ were normally distributed, which supports the view that encoding style is distributed on a continuum ranging from extremely internal to extremely external.

Furthermore, the relationship found between internal encoding style and the specific two facets of impulsivity contributes to the construct validity of the French ESQ. More specifically, our results have shown that the more internal encoding style is associated with higher urgency and lower perseverance, whereas no relationship was found with sensation seeking and the lack of premeditation.

This pattern of correlations appears to be highly consistent with the theoretical concept to encoding style and the previous data. Specifically, as expected, internal encoders displayed higher levels of urgency, which is defined as the tendency to experience strong reactions in negative emotional contexts (but also in positive ones, see Cyders et al., 2007, for a definition of “positive urgency”). Considering that the highly internal encoding style involves a strong tendency to impose (almost compulsively) on stimuli preexisting categories (i.e. interpretative schemata) even if the stimuli do not match the categories very well, this result is consistent with the notion that high urgency people may have increased difficulties to inhibit their personal interpretative schemata in intense emotional contexts. Such a difficulty to inhibit internal personal schemata in intense emotional contexts could have dysfunctional long-term consequences (i.e. the self-perpetuation of maladaptive schemata) and may even contribute to the development of symptoms of emotional psychopathology, as suggested by the clearly established association between urgency and numerous disorders (e.g., depressive symptoms, Miller et al., 2003; substance abuse Verdejo-García et al., 2007; Billieux et al., 2007a; pathological gambling, Whiteside et al., 2005) and problematic or even maladaptive behaviors (e.g., dependence on the mobile phone, Billieux et al., 2007b; compulsive buying, Billieux et al., 2008a; aggressiveness, Miller et al., 2003). Note that the “vicious cycle” of gradual increase of attentional/perceptual biases, such as those demonstrated in the research on self-perpetuation is considered “not simply a by-product of the emotional disorder, but plays a vital role in its causation and maintenance” (Williams et al., 1996, p. 3), and as mentioned before, internal encoding style was found to be correlated with the higher tendency to self-perpetuate in the process of encoding.

Table 1  
Means, standard deviations, Cronbach’s  $\alpha$  of the questionnaires.

	<i>M</i>	<i>S.D.</i>	$\alpha$
ESQ	18.13	5.86	0.77
UPPS – Urgency	28.60	5.38	0.83
UPPS – Lack of premeditation	22.09	5.54	0.92
UPPS – Lack of perseverance	19.54	4.15	0.80
UPPS – Sensation seeking	29.37	7.14	0.86

ESQ stands for encoding style questionnaire.



Internal encoding style was also related to low perseverance, that is, the tendency to have difficulties to remain concentrated on a task that may be boring and/or difficult. This relationship is not surprising as people who are more focused on internal schemata and less attentive to their external environment probably experience increased difficulties when facing with complex, tedious tasks, and especially on tasks requiring a prolonged, consistent focus on external stimuli (e.g., one can speculate that they might be more prone to “mind wandering” in such situations), which is also consistent with the finding by Osicki (a Ph.D. dissertation, cited in Lewicki, 2005) who tested vocational choices made by 491 graduating college majors and found that external encoders are more likely to chose vocations that require tolerance for tedious work closely related to objective, external data—such as accounting, computer programming, or engineering, as opposed to internal encoders who are more likely to chose arts, humanities, or advertising. This explanation is also supported by the results of a recent study by Herndon (2008) showing that internal encoders experience a higher frequency of cognitive failures (e.g., distractibility) as assessed by the cognitive failure questionnaire (CFQ) (Broadbent et al., 1982) and they also exhibit a lower level of mindfulness (i.e. the capacity to be attentively tuned to what is happening in the “here and now”) as assessed by the mindfulness attention awareness scale (MAAS) (Brown and Ryan, 2003).

No relationship was found between internal encoding style and the “lack of premeditation” component, which is defined as the difficulty to reflect on the consequences of an act before engaging in it. A recent study (Zermatten et al., 2005) showed that lack of premeditation was specifically related to disadvantageous decisions in an ecological task designed to simulate real-life decision making (Iowa Gambling Task, Bechara et al., 1994). Thus, as decision making processes are partly influenced by somatic or emotional markers (the somatic marker hypothesis, Damasio, 1994), internal encoders could have been expected to be more sensitive to these markers, which could result in increased premeditation. However, it should also be noted that other processes could also contribute to premeditation, and particularly executive processes such as updating, inhibition, or shifting. (Miyake et al., 2000), which could explain the absence of significant relationship between encoding style and the lack of premeditation component of impulsivity.

Finally, there are no relationship between encoding style and sensation seeking, defined as the preference for exciting activities and the openness to new experiences. However, this absence of correlation is not surprising as this component of impulsivity has been postulated to reflect motivational mechanisms (e.g., approach tendencies, reward drive) and not cognitive ones (Billieux et al., 2008b; Van der Linden et al., 2006b).

While the observed pattern of correlations between the four components of impulsivity and encoding style appears to be highly consistent with the theory of encoding styles, further research is necessary to confirm and more systematically explore the results obtained in this study. For example, it would be valuable to correlate the encoding style with laboratory tests designed to assess the psychological mechanisms underlying both the urgency and perseverance facets of impulsivity. Indeed,

Bechara and Van der Linden (2005) have recently postulated that urgency and perseverance may depend on two distinct inhibitory functions identified by Friedman and Miyake (2004): the prepotent (or automatic) response inhibition and the resistance to proactive interference (i.e. the ability to resist the intrusion into memory of information that was previously relevant but has since become irrelevant). More specifically, we have recently shown (Gay et al., *in press*) that high urgency is associated with a difficulty to inhibit automatic or prepotent responses (on a go/no-go task), whereas low perseverance is associated with increased difficulties to overcome the effect of proactive interference (on a task designed to assess proactive interference in working memory). Accordingly, a direct investigation of the relationship between individual differences in encoding style and these two psychological mechanisms involved in urgency and perseverance could further validate and extend the results obtained in the present study.

The fact that our sample is composed almost entirely of female participants might represent a potential limitation of the study. However, it should be noted here that although some previous studies showed a trend indicating that female experience split-second illusion slightly more often than males, the size of this effect is very small (average  $\eta^2 = 0.035$ ). Consequently, and taking into account the excellent fit of the model tested in the present study, it is reasonable to expect that this model is equally applicable to samples with a higher representation of males.

To conclude, this French version of the ESQ has good psychometric properties and it can be used to assess individual differences in internal versus external encoding style. Moreover, the structure of the relation found in this study between the encoding style and the four components of impulsivity (as identified by UPPS) appears to be consistent with the theoretical considerations regarding the personality of internal versus external encoders as well as the previous data on personality correlates of encoding style.

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