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Encoding style and its relationships with schizotypal traits and impulsivity during adolescence

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ABSTRACT

This study intends to explore how individual differences in encoding style (i.e. how encoding is implicitly affected by pre-existing schemata, so called an internal style, versus by cues from the outside world, so called an external style) are associated with schizotypal traits and impulsivity expression during adolescence. Moreover, we aim to provide first evidence reliability for the encoding style questionnaire with an adolescent sample. 101 French-speaking community adolescents ($M_{age} = 16.06$, $S.D._{age} = 2.01$; 57 girls; primarily Caucasian) participated in a cross-sectional study. The whole sample filled out a battery of self-report questionnaires. Our data supports a positive association between a predominant internal encoding style, the level of positive and disorganized schizotypal traits, and a higher degree of urgency and sensation seeking impulsivity components. On the one hand, these results have clinical implications in the sense that a low level in implicit processing, namely encoding style, is involved in positive and disorganized schizotypal traits as well as in impulsivity. Schizotypal traits and impulsivity are two sets of traits that put youth at risk for the development of severe psychopathological states in adulthood. On the other hand, this research enables an increased understanding of encoding style by providing the first reliable assessment tool for French-speaking adolescents.

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1. Introduction

Adolescence represents an important developmental stage marked by notable cerebral, cognitive and social changes (Steinberg, 2005). In approximately 10% of adolescents (van Os et al., 2009) perplexing and distressing mental phenomena, such as delusion and hallucination-like symptom expression (so-called positive schizotypal traits) arise during teenage years (Cougnard et al., 2007). Epidemiological studies suggest that positive schizotypy holds significant predictive power for the unfolding of psychotic disorders in adulthood (Poulton et al., 2000; Gooding et al., 2005). To date however, few studies examine the potential cognitive processes that may promote the expression of positive schizotypal traits during adolescent development.

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Recent evidence suggests that low-level aspects of encoding, namely encoding style, may constitute one important cognitive process involved in the expression of positive schizotypal traits.

Encoding style belongs to processes involved in nonconscious knowledge acquisition and underlies important individual differences. Differences are especially observed in the schemas, which are defined (following a specific usage of the term; see Lewicki, 2005) as early implicit filters that influence the way individuals encode external information. These schemas are imposed onto our external world in the very first phase of ambiguous information processing. Indeed schemas may behave as early filters that restrain what a person can notice (encode) and, thereby, influence the subsequent dynamic and implicitly acquired knowledge. Studies in cognitive psychology have shown that encoding processes impose on stimuli pre-existing categories (interpretive schema), regardless of the fact that the stimuli do not perfectly fit those categories. Nevertheless, even if the match is not totally accurate, the schema is always prompted by a minimum of supportive external evidence. The degree of information necessary to instantiate an interpretative schema (so called schema

instantiation threshold, SIT) varies among individuals and represents a trade-off between speed and accuracy, such that a lower threshold leads to faster encoding and decreased accuracy in the final encoded product. The SIT relates to how individuals may be characterized as internal (i.e. hasty) versus external (i.e. conservative) encoders. Internal encoders show a greater probability to interpret environmental cues in terms of pre-existing encoding categories (Lewicki et al., 1992; Lewicki, 2005). Importantly, this higher probability to rashly interpret external stimuli in terms of internal schema is reinforced through the process of self-perpetuation (Lewicki et al., 1992; Lewicki, 2005), which explains how individuals tend to draw relations between variables that are not interrelated in the real world. For instance, one might think that people with dark eyes (A) are harmful (B) level of danger, which leads one to believe that each time one meets (A) without explicit data on (B) (level of danger), he will tend to encode B's level of anger in a way that is consistent with his initial biased A–B relation. Then, the strength of the schema supporting the relation between A and B can increase over time, even in the absence of any supportive evidence. While self-perpetuation is common propensity for everyone, its strength can vary across individuals. It is thought to underlie interpretative biases involved in serious mental disorders, such as paranoia (Combs et al., 2003; Lewicki, 2005), obsessive-compulsive symptoms (Belayachi and Van der Linden, 2010) or anxiety and depression (Hill et al., 1991).

In other words, an internal encoding style may facilitate, through self-perpetuation, various psychopathological states. Recently, it has been argued that a predominant internal style may account for positive schizotypal traits in adulthood (Valérie et al., 2011) and contribute to the total level of schizotypal traits in adolescents (Badoud et al., submitted for publication). Indeed, an extreme internal style may present a risk of losing touch with reality and lead to a higher propensity of psychotic-like symptoms (Gill, unpublished results).

With regards to adolescence specifically, it is noteworthy to mention that adult internal encoders have been found to exhibit higher levels in specific facets of impulsivity (Billieux et al., 2009). As conceptualized by the model of Whiteside and Lynam (2001), impulsivity encompasses four separate components associated with impulsive behaviour, namely urgency, (lack of) premeditation, (lack of) perseverance and sensation seeking. This is of particular interest as impulsivity represents a core feature for the risk of externalizing psychopathology in adolescents (e.g., Luengo et al., 1994). Indeed adolescence is often characterized as a period marked by the emergence of impulsive and sometimes problematic behaviours, including violent delinquency, substance abuse and risk-taking behaviour (Steinberg, 2007).

While impulsivity might also be developmentally normative in adolescence (e.g. Steinberg et al., 2008, who show that the developmental course of sensation seeking follows an u-inverted curve, which increases between preadolescence and mid-adolescence and then declines), evidence suggests that higher levels of impulsivity are at the heart of many problematic behaviour that arise in late adolescence and in adulthood (e.g. antisocial behaviour or excessive gambling, Luengo et al., 1994; Vitaro et al., 1999; Moeller et al., 2001). To the best of our knowledge, the examination of internal encoding style in relation to adolescent impulsivity has yet to be performed. Similarly, the links between internal encoding style, impulsivity and positive schizotypy during adolescence have yet to be investigated.

In line with a developmental psychopathology approach (Cicchetti and Rogosch, 2002), investigating the cognitive mechanisms that potentially sustain impulsivity and schizotypal traits expression in adolescence is crucial given their potential implications in the emergence of adult psychopathology. In particular, the close examination of adolescent encoding style may prove to be

clinically and scientifically useful, especially for early identification of psychosis and disorders involving lack of impulse control. Indeed, in the line of the theoretical conceptualization of encoding style and previous associations with clinical conditions in adult samples, encoding style might be considered as a promising candidate for an early cognitive marker indicating susceptibility to psychopathology, mainly psychosis, in adolescence. This could strengthen early identification of at-risk youths before they present full-blown psychopathology. However, the main obstacle in our current understanding of adolescent encoding style lies in the lack of a reliable validated tool for this age range. Such an instrument would allow an efficient evaluation of individual encoding style.

In its first scientific elaboration, the assessment of encoding style relied upon in heavy experimental settings, using tachistoscopic devices and partial display experiments (e.g. Gill, unpublished results). While such settings provided evidence for lower SIT in internal encoders (Gill, unpublished results), their impracticality prevented wider investigations of encoding style. To overcome this issue, Lewicki (2005) developed a self-report scale entitled “encoding style questionnaire” (ESQ) designed to ask simple questions about the frequency of split-second illusions in daily life as an index of encoding style. The rationale implies that the individual level of SIT (i.e. the amount of supportive evidence a person needs to collect before implicitly imposing an interpretative schema when facing equivocal stimuli) will condition the frequency of having split-second illusions (Lewicki, 2005). The validation of the ESQ has been performed with adult samples, in English (Lewicki, 2005) and French (Billieux et al., 2009).

The present research sets out to explore the relationships between encoding style and both impulsivity and schizotypal trait expression during adolescence. As neither the psychometric properties of the ESQ nor its factorial structure have ever been tested in adolescent populations, we began by validating the French version of the ESQ (Billieux et al., 2009) in a community adolescent sample, using confirmatory factorial analysis. This subsequently allowed us to perform correlation analyses between encoding style, facets of impulsivity and schizotypy measures. Thus, this study is directed by two main objectives. First, we aim to provide a validation of the ESQ for an adolescent population. Following Billieux et al. (2009), we postulate that a single-factor structure will best fit our data. Second, we intend to explore how encoding style is associated with, on the one hand, the level of schizotypal traits and, on the other hand, impulsivity facets. Regarding schizotypal traits, we expect that adolescents with a predominantly internal encoding style will show higher levels of positive schizotypal traits. The rationale relies on recent cognitive models of positive psychotic symptoms (Morrison et al., 1995; Garety et al., 2001) and empirical results highlighting that internally generated information in the form of internal schemata can readily interfere with the reality testing. Indeed, previous work suggests that adolescent schizotypal expression is affected by beliefs about oneself (Debbané et al., 2012), and that in memory tasks the attribution of an internal content (e.g. a thought) to an external source is associated with increased positive schizotypal expression, in non-clinical adolescents (Debbané et al., 2009), and adults (Larøi et al., 2005), as well as in adults with schizophrenia (Brébion et al., 2000; Keefe et al., 2002). Together, these studies suggest that an internal style may consistently sustain faulty attributions in everyday life, thereby representing an early developmental potentiator of positive schizotypal expression in adolescence.

Concerning impulsivity, and in keeping with initial evidence provided by Billieux et al. (2009), we posit a link between an internal encoding style and high levels of urgency and lack of perseverance. Urgency is defined as the tendency to experience strong reactions under the condition of negative affect (Whiteside

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