The present work proposes an integrative model of creativity that includes personality traits and cognitive processes. This model hypothesizes that three high-order personality factors predict two main process factors, which in turn predict intensity and achievement of creative activities. The personality factors are: Plasticity (high openness, extraversion, energy, and inspiration), Divergence (low agreeableness and conscientiousness, high non-conformity and impulsivity), and Convergence (high ambition, precision, persistence, and critical sense). The process factors are Generation (idea production and originality) and Selection (idea evaluation and formalization). We hypothesized and found that: (a) Plasticity and Divergence predict positively Generation, (b) Convergence predicts positively Selection, (c) Generation, Selection, and their interaction predict positively both intensity and achievement of everyday creative activities.

Keywords: everyday creativity, personality, structural model, generation, selection.

The aim of this article is to propose a model of creativity and personality based on a classical distinction from the cognitive tradition. Hence we start by reviewing the main cognitive processes that have been related to creativity in the literature. Then, we discuss personality variables related to creativity. Finally, we propose an integrative model that formally organizes the relations between these variables and synthetizes their role in real-life creative activities.

CREATIVITY AND COGNITIVE PROCESSES

The literature on cognition and creativity is very rich and, consequently, an exhaustive review would be beyond the scope of this article. Hence, as a basis for this section, we rely on Bink and Marsh’s (2000) synthesis on cognitive regularities in creative activity. The main idea is that there are two wide classes of processes central to creativity that work in cooperation to lead to creative ideas: Generation and
Selection. These processes are described below and their relations with other, similar distinctions are briefly discussed.

**GENERATION**

More than 50 years ago, Guilford (1956) argued that divergent thinking, the ability to find many and various ideas, was a key ability for creativity. Expanding on this tradition, Bink and Marsh (2000) proposed a wider conception of divergent processes, which encompasses what they called Generation, that is, both idea’s production and synthesis. In line with Carroll (1993) and Finke, Ward and Smith (1992), Bink and Marsh argued that this class of processes is similar to memory retrieval, with a specific associative or synthetic feature. More concretely, processes from the Generation continuum are responsible for the quantity and originality of ideas. Empirically, in divergent thinking tasks, the number of ideas (fluency), their diversity (flexibility), and originality are indeed often highly correlated (e.g., Plucker, 1999; Silvia et al., 2008).

By extension, this perspective can be connected to many other theories or influential distinctions in creativity research. For example, the central role of original associations of ideas was also early emphasized by Mednick (1962) and further elaborated by Eysenck (1993). Additionally, synthesis as described by Bink and Marsh (2000) can be compared to synthetic abilities in Sternberg’s triarchic theory of intelligence (Sternberg, 1985). In sum, Generation encompasses virtually all the typical processes associated with creativity. Albeit its central role in creativity, Generation is nevertheless not the only class of processes related to creativity.

**SELECTION**

Indeed, if Generation is essential for creativity, it is not sufficient: quantity is of no use if there is not a minimal guarantee for quality; unconstrained and weird associations are not synonymous with creativity. For this reason, many theories of creativity include a second class of processes: idea evaluation or selection. In their review, Bink and Marsh (2000) described Selection processes as encompassing criticism, evaluation, formalization, and elaboration of ideas. In this context, the role of Selection is to retain subsets of relevant information from Generation processes (either single or already combined elements). The ultimate goal of Selection is thus to form a coherent final product by providing a constant check during its development. Unfortunately, despite their obvious importance for creativity, Selection processes have traditionally not received as much attention in the literature as the Generation processes.

However, in recent years, a growing interest for these processes has reemerged. Several authors (see for instance Runco, 2003) have emphasized the importance of critical processes, which allow evaluating and selecting best ideas, checking for relevance and appropriateness with respect to the task’s constraints, and searching for improvement. Furthermore, this class of processes can partially be assimilated or extended to analytical thinking as described by Sternberg (1985), which is tantamount to “classical” intelligence (reasoning and problem solving abilities). These abilities are also similar to convergent abilities described by Guilford (1956), which
also imply logic, accuracy, and ability to zero in on a best single answer. In sum, the core of Selection, as we understand it here, encompasses the notions of deep evaluation, critical thinking, and thorough formalization.

EXTENDED VIEWS OF GENERATION AND SELECTION

To conclude this first section, we would like to point out some similarities between this Generation/Selection approach and other research traditions. First, there is the evolutionary perspective proposed by Campbell (1960) and further developed by Simonton (1997). The central idea of this approach is that creativity relies on a variation mechanism or ideation rate (roughly equivalent to Generation) and a selection mechanism or elaboration rate (roughly equivalent to Selection). In the cognitive style tradition, Kirton (1976) distinguished between innovators, who prefer original thinking and norm challenging behavior and adaptors, who are more concerned with resolving problems and searching for improvement (see also the distinction between convergent and divergent thinker, for example, Brophy, 2000; Cropley, 2006). In an historical approach, Galenson (2001) distinguished between “finders,” who innovate quickly and at a young age, and “seekers,” who progress slowly, through a long trial and error process. In the domain of affect, De Dreu, Baas and Nijstad (2008) proposed that creativity can be achieved through flexibility, which is enhanced by positive affect, and persistence, which is enhanced by negative affect. Last, in the psychoanalytic tradition, Suler (1980) has argued that creativity required both primary processes (i.e., loose, illogical, and highly subjective ideation) and secondary processes (i.e., to conscious elaboration of a socially appropriate and meaningful product).

Though very different in nature, all these approaches seem to fit within the original Generation/Selection distinction: finding new and various ideas in a quick, automatic, and flexible way is certainly reminiscent of Generation, whereas seeking improvement and elaboration through persistence and conscious effort is obviously very close to Selection. There are arguably more connections to be found in the creativity literature. Following this idea, we now try to articulate Generation and Selection with classic personality factors.

PERSONALITY AND CREATIVITY

As for the process-related literature, the research field investigating the relations between personality and creativity is vast. In order to offer a gradual simplification of the number of personality factors considered, we start with the five-factor model and then progressively move toward simpler models. Ultimately, the aim is to associate a small set of classical personality factors with the processes described in the previous section.

However, there are not many studies that directly investigated the relations between personality factors and Generation and Selection. An important exception concerns divergent thinking, a crucial component of Generation. Concerning Selection, there is no equivalent and, consequently, considerations about personality and Selection will be more speculative. Additionally, we will also employ another classical distinction, namely the one among everyday, scientific, and artistic creativity. In the
third section, we will then come back to an explicit discussion of Generation, Selection, and personality.

THE BIG FIVE FRAMEWORK

The Big Five framework is one of the most influential paradigms in personality research. Much research on creativity and personality has been conducted in this important perspective; we review briefly some of this research.

Openness (O) appears to be strongly associated with all kinds of creativity. According to McCrae and Costa (1997), openness is one of the fundamental dimensions related to artistic temperament. Empirically, the general O factor and many of its underlying traits (e.g., fantasy, flexibility, curiosity, wide interests) are positively related to virtually all types of creativity, at all levels of achievement (Batey & Furnham, 2006; Feist, 1998). In particular, O is positively related to divergent thinking (McCrae, 1987). Indeed, O is by definition related to curiosity and variety of experience, which implies higher knowledge and number of elements available in long-term memory (Ashton, Lee, Vernon & Jang, 2000). Moreover, according to Batey and Furnham (2006), O consists of both attitudinal openness to new experience and an inability to inhibit irrelevant information (perceptual openness), which can be related to access to original, unexpected ideas; the former being the most classic attribute of O whereas the latter was only highlighted more recently (Peterson & Carson, 2000). (Such perceptual openness is also a classical attribute of Psychoticism; see below, next sub-section.)

Extraversion (E) is generally conceptualized as a high-order factor embracing high energy, positive affect, sociability, enthusiasm, novelty seeking, dominance, self-confidence, and assertiveness (Pervin & John, 1999). Except for the specific case of sociability, all these traits (especially dominance and positive affect) have been found to be positively associated with divergent thinking and other measures of creativity (Baas, De Dreu & Nijstad, 2008; Batey & Furnham, 2006; Feist, 1998). Sociability, a facet of extraversion, has shown mixed relationships with artistic and scientific creativity, especially for high creative achievers, who supposedly need time alone to conceive and elaborate ideas (Feist, 1998).

For Neuroticism (N), domain or field specificity appears to be important. According to Feist (1998) artists are more anxious, emotional, and sensitive—traits at the core of the N factor—whereas scientists are more likely to be affectively stable. However, it is unclear if N has just an influence on the preference for certain domains of creativity, leading neurotic people to choose an artistic field to express themselves (Eysenck, 1993), or if N is really a facilitator in art, leading to higher achievement, through higher sensitivity to emotional stimuli and communication of emotional ideas in a work of art (Batey & Furnham, 2006).

Conscientiousness (C) seems, at first glance, negatively related to artistic creativity and positively related to scientific creativity, but the reality is more subtle. First, whereas scientists are higher on C than the general population or than artists, highly creative scientists, when compared to less creative scientists, are lower on C (Feist, 1998). Second, it is likely that the C factor masks important specificities. Indeed, C
is positively related to energy, organization, and work efficiency (Pervin & John, 1999), which are favorable to creativity (especially to high creative achievement). This may be due to a positive impact of C on Selection. However, on the other hand, C is negatively related to Psychoticism and inhibition, both of which are also positively related to creativity and divergent thinking (Eysenck, 1993). Hence, C is ambiguously related to creativity. As Csikszentmihalyi (1996) suggested, it is possible that paradoxical traits or complex personality are the hallmark of creative people.

Agreeableness (A) is most often negatively associated with creativity; creative people, especially artists, but also scientists, are more likely to be hostile, asocial, unconventional, and norm rejecting (Feist, 1998). Batey and Furnham (2006) also reviewed several studies showing that creative people have tendencies toward low A, being less deferent and team oriented, less socialized and self-controlled, as well as less tolerant and concerned with good impressions. (This A factor is also closely related to Psychoticism.)

MORE PARSIMONIOUS PERSPECTIVES

In a more parsimonious perspective than the Big 5, some authors have focused on fewer higher order factors, such as Plasticity and Stability (DeYoung, 2006; Digman, 1997), or Psychoticism (Eysenck, 1992a). This sub-section investigates how these higher-order traits are relevant to our general goal of providing a synthetic model of personality and creativity.

As depicted in Figure 1, Plasticity is a high-order factor defined by high E and O (DeYoung, 2006; Digman, 1997). This factor appears as a potential powerful predictor of creativity: as detailed in the previous sections, E and O are overall positive predictors of different kinds of creativity, so it seems reasonable to suppose that their joint contribution should have good predictive power. Although empirical studies on Plasticity and creativity are still quite rare, recent results have shown that

![Figure 1. Various models of personality and their relations.](image)

*Note.* O = Openness; E = Extraversion; A = Agreeableness; C = Conscientiousness; N = Neuroticism; P = Psychoticism.
Plasticity is positively related to various measures of everyday creativity and divergent thinking (Silvia, Nusbaum, Berg, Martin & O’Connor, 2009; Silvia et al., 2008). In a different perspective, Eysenck (1993) made interesting suggestions for an integrative theory of personality and creativity based on the concept of Psychoticism (P). P is composed of several lower-order traits, such as “aggressive,” “cold,” “anti-social,” and “impulsive” (Eysenck, 1992a). As shown on Figure 1, it can be more simply conceived as a combination of the inverse of the A and C factors of the Big 5 (see Zuckerman, Kuhlman, Joireman, Teta & Kraft, 1993). Eysenck has argued that P constitutes a genetic advantage for creativity, principally through its relation with low cognitive and behavioral inhibition, which consequently leads to higher ideational fluency and originality, as well as to higher independent and norm challenging behavior. Many details about the conceptualization of P have been vigorously debated (e.g., Costa & McCrae, 1992; Eysenck, 1992b) but this parsimonious theory has provided insightful lines of research and has led to many supporting empirical results (see Acar & Runco, 2012; Batey & Furnham, 2006).

Finally, Stability, defined by low N as well as high A and high C (DeYoung, 2006; Digman, 1997), represents a quite ambitious synthesis of three of the Big 5 factors that also encompass the concept of P (which correspond to low A and low C, as already mentioned and depicted in Figure 1). For our purposes, it appears that this factor holds strong potential for synthesizing many relations. For example, Stability should be negatively related to artistic creativity. Being “unstable” (i.e., nervous, not agreeable, and not conscientious), should provide an advantage in the arts. However, for scientific creativity the pattern would not be as simple: scientists are often low on N but also low on A and high on C—conflicting results that cannot be summarized using the Stability factor.

**A SYNTHETIC MODEL**

In this final section, we focus on the second-order factors of personality and their expected relations with Generation and Selection. In the end, we provide a summary of our model and a detailed list of corresponding hypotheses.

**PERSONALITY VARIABLES RELATED TO GENERATION**

We have seen that Plasticity (i.e., Extraversion and Openness) is expected to be positively related to Generation. Plasticity (or at least E) is also related to positive affect, known to contribute positively to idea generation, exploration and risk taking (e.g., Baas et al., 2008; Schwarz, 1990; Vosburg, 1998). Furthermore, it is likely that Plasticity is positively related to the more general and elusive concept of inspiration, arguably central to creativity. Conceptualizing inspiration as a general construct characterized by evocation, motivation, and transcendence, Thrash and Elliot (2003, 2004) have found several positive correlations between O, E, positive affect, creativity, and inspiration. Hence, we believe that inspiration can be subsumed to Plasticity.

Additionally, high Psychoticism, or low Agreeableness and Conscientiousness, are also known to have a positive impact on processes from the Generation spectrum; an impact due probably to low inhibition (cognitive and behavioral), which facilitates unusual,
loose, and original idea associations (Eysenck, 1993; Stavridou & Furnham, 1996). Therefore, we propose that a second-order factor of Divergence (i.e., low Agreeableness, high impulsivity and non-conformism) should be correlated to Generation as well.

PERSONALITY VARIABLES RELATED TO SELECTION

Concerning Selection processes and personality, it is likely that traits such as ambition or persistence are not well represented in Plasticity or Psychoticism. These traits are specific descriptors of Conscientiousness, whose overall effect on creativity is most often found to be negative, as mentioned above. However, it is likely that these traits should be positively related to Selection, which requires intense work and deep evaluation. Consistent with this, Herman and Reiter-Palmon (2011) have shown that a prevention focus, characterized by cautiousness and safety-oriented behavior, was related to more accurate evaluation of quality in a creative task.

Therefore, we suggest that for the specific purpose of creativity research, it might be necessary to distinguish and model these traits separately. Following this idea, we coined a factor called Convergence, which regroups traits such as persistence, critical sense and precision. In the end, it is thus likely that the Conscientiousness factor will be also be related to Convergence, but positively (whereas it should be negatively related to Divergence). This paradoxical splitting of Conscientiousness reflects the ambiguous nature of its relationship with creativity.

SUMMARY AND HYPOTHESES

In light of the above developments, we propose the following main hypotheses: (a) Plasticity and Divergence predict positively Generation, (b) Convergence predicts positively Selection, (c) Generation and Selection, and most importantly their interaction, predict positively the creative product, activities, and achievement. These hypotheses have been tested in two main studies, which are reported and discussed below.

METHOD AND RESULTS (TWO STUDIES)

STUDY 1

Participants and procedure

The sample consisted of 112 first-year undergraduate psychology students at the University of Geneva (88% of women; mean age of 21.3 years, $SD = 3.3$). Students participated voluntarily and without payment. Paper questionnaires were distributed at the beginning of a mandatory course and collected immediately after completion. The total duration of data collection was approximately 20 minutes.

Measures

Personality

The classical Big 5 personality factors were measured with a short adjective check list, with 8 items for each factor (4 scored positively and 4 scored negatively). The

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1 All scales presented here were developed in previous pilot studies (Fürst, 2012). The original items of the new personality scales are provided in the Appendix.
Big 5 scales were a French adaptation of the best markers in English (John & Srivastava, 1999; Saucier, 1994). Recent retesting of these scales in an independent undergraduate sample (n = 254) showed good convergent validity with the NEO-FFI (Costa & McCrae, 1989): the correlations between the analogous factors of the two scales were about .90 (except for Extraversion, which correlated at .75, perhaps due to the NEO-FFI’s stronger focus on energy).

Six additional traits were also assessed to extend and specify the conceptualization of the second-order factor of personality: Inspiration/Energy (4 items scored positively; supposed to load positively on the Plasticity factor with O and E), Non-conformism, and Distraction (3 items scored positively; supposed to load positively on the Divergence factor, itself loading negatively on A and C), Persistence, Precision, and Critical Sense (3 items for each trait, 8 scored positively and 1 scored negatively; supposed to load positively on the Convergence factor). For all these personality items, participants were asked whether the adjectives describe them well or not, using a scale from 1 = “not very much” to 5 = “very much.”

Creativity

Generation and Selection were measured with 12 items, 6 for each factor, all scored positively. For each item describing a supposedly prototypical sub-process (e.g., for Generation: “Having a lot of ideas,” “Make original associations of ideas”; for Selection: “Criticize, evaluate my work,” “Verify, correct imperfections”) participants were asked to tell how frequently it applied to their work, using a scale from 1 = “almost never” to 5 = “very often.”

Everyday creativity was measured using two scales: intensity of practice in 11 prototypical creative activities (e.g., writing, painting, drawing, producing music, dancing, acting), evaluated through mean time (in hours) spent per week on each of them, and self-rated seriousness of this practice (Verhaeghen, Joorman & Khan, 2005); overall achievement in these activities was evaluated with 7 items (e.g., “People have commented on my talent in this domain,” “I have won a prize in this domain”), rated on a five-point scale, ranging from 1 = “never” to 5 = “very often.” These items were translated and adapted from the Creative Achievement Questionnaire (CAQ; Carson, Peterson & Higgins, 2005).

Data analyses

In the current analyses we proceeded in two steps. First, we applied separate confirmatory factor analyses to all first-order factors. This allowed testing each measurement model and assuring that personality and creativity constructs are adequately represented by their items (Bollen, 1989). For reasons of space, the details of these models are not reported. However, Table 1 contains each factor’s estimated mean and standard deviation, as well as its items’ mean loading. Additionally, we tested with Structural Equation Models (SEM) three sub-models (corresponding to personality, process, and everyday creativity). Classical fit indices of these sub-models are detailed in Table 2. Ultimately, in step 2, the final model was estimated, using first-order factors scores estimated at step 1. Hence, as shown in Figure 2, there are only
### TABLE 1. Description of the First-Order Factors in Both Studies

<table>
<thead>
<tr>
<th></th>
<th>Study 1</th>
<th>Study 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Factor Mean</td>
<td>Factor SD</td>
</tr>
<tr>
<td>Conation/Personality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extraversion</td>
<td>3.32</td>
<td>0.85</td>
</tr>
<tr>
<td>Openness</td>
<td>4.10</td>
<td>0.40</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>2.84</td>
<td>0.87</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>3.91</td>
<td>0.51</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>4.33</td>
<td>0.39</td>
</tr>
<tr>
<td>Inspiration</td>
<td>3.47</td>
<td>0.39</td>
</tr>
<tr>
<td>Non-conformism</td>
<td>3.18</td>
<td>0.60</td>
</tr>
<tr>
<td>Distraction</td>
<td>3.08</td>
<td>0.62</td>
</tr>
<tr>
<td>Persistence</td>
<td>3.83</td>
<td>0.90</td>
</tr>
<tr>
<td>Precision</td>
<td>3.74</td>
<td>1.14</td>
</tr>
<tr>
<td>Critical Sense</td>
<td>3.78</td>
<td>0.20</td>
</tr>
<tr>
<td>Cognition/Process</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Divergent thinking</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Generation</td>
<td>3.42</td>
<td>0.51</td>
</tr>
<tr>
<td>Selection</td>
<td>3.80</td>
<td>0.18</td>
</tr>
<tr>
<td>Everyday/Creativity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intensity</td>
<td>6.34</td>
<td>4.17</td>
</tr>
<tr>
<td>Achievement</td>
<td>3.48</td>
<td>0.86</td>
</tr>
</tbody>
</table>

*Note.* Kurtos. = Kurtosis; Skew = Skewness; alpha = Cronbach’s alpha. All means, standard deviations, and loadings were significantly different from 0. For further details about the differences in operationalization across the two studies, see explanation in the main text and original items in Appendix.
3 actual latent variables in this final model (i.e., Plasticity, Divergence, and Convergence). The remaining variables, represented as rectangles, are not latent in this model, given they are estimated at step 1. This two-step procedure is indicated when the simultaneous estimation is not feasible because of the high number of items relative to the total sample size (Chou, Bentler & Pentz, 2000), which renders the estimation of many parameters impossible. All analyses were conducted with Mplus 5.2 (Muthén & Muthén, 2007).

Results and discussion

Table 1 details the descriptive statistics and mean loading of each factor’s estimated scores. With very few exceptions (A and O factors) mean factor loadings were higher than 0.5. Some Cronbach’s alphas were a bit low, very likely because the scales were measuring complex constructs with a limited number of items.² Skewness and Kurtosis are virtually all within an acceptable range (all inferior to |1|). The only exception concerns the intensity factor (Skewness = 1.36; Kurtosis = 1.89). To clarify the impact of this potentially problematic distribution, we tried to transform the two indicators of this latent variable (i.e., time spent and seriousness) using a logarithmic function. As results were not substantially different with this transformation, we finally decided to keep the raw, original scores. Then we proceeded with the testing of the sub-models.

The personality sub-model included 10 manifest variables and 3 latent variables: Plasticity (E, O, and Inspiration), Convergence (C, precision, persistence, and critical

### TABLE 2. Goodness-of-Fit Indices of the Components and the Overall Structural Equation Model (Study 1)

<table>
<thead>
<tr>
<th>Component</th>
<th>k</th>
<th>df</th>
<th>Param</th>
<th>$\chi^2$</th>
<th>RMSEA (90% CI)</th>
<th>SRMR</th>
<th>CFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personality</td>
<td>10</td>
<td>31</td>
<td>34</td>
<td>86.51</td>
<td>0.128 (0.096; 0.160)</td>
<td>0.107</td>
<td>0.682</td>
</tr>
<tr>
<td>Process</td>
<td>12</td>
<td>53</td>
<td>37</td>
<td>77.28</td>
<td>0.064 (0.028; 0.094)</td>
<td>0.072</td>
<td>0.922</td>
</tr>
<tr>
<td>Everyday Creativity</td>
<td>9</td>
<td>24</td>
<td>30</td>
<td>50.48</td>
<td>0.100 (0.061; 0.139)</td>
<td>0.075</td>
<td>0.926</td>
</tr>
<tr>
<td>Overall Creativity</td>
<td>15</td>
<td>83</td>
<td>52</td>
<td>160.4</td>
<td>0.092 (0.070; 0.113)</td>
<td>0.103</td>
<td>0.739</td>
</tr>
</tbody>
</table>

Note. k = number of indicators in the model; df = degree of freedom; param = number of estimated parameters; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean squared Residual; CFI = Comparative Fit Index.

² For example, the Openness scale reliability is low because it has to compromise between “openness” (e.g., open to change) and “intellect” (e.g., like abstract ideas)—the dual nature of this factor and subsequent issues measuring it are well-known in the personality literature (e.g., John & Srivastava, 1999). Moreover, the low reliability is also likely due to the low number of items. For example, by applying the Spearman-Brown formula (Allen & Yen, 1979) to the Critical Sense scale we can see that, all things being equal, if we increase the number of items from three to six, the obtained reliability estimate increases from .51 to .76.
sense), and Divergence (A, C, non-conformism, and distraction). The fit of this model was not very satisfactory (first line of Table 2), mostly due to some residual correlation. The Process sub-model included 12 items and 2 latent variables (Generation and Selection), with 6 items for each latent variable. This model had a relatively good fit (second line of Table 2), indicating adequate measurement of these process variables. The Everyday Creativity sub-model included 9 items and 2 latent variables (Intensity, estimated with the “time spent” and “seriousness” items, and Achievement, estimated with the seven achievement items). This model had acceptable fit (third line of Table 2), though the RMSEA was slightly high.

In the end, 15 variables were included in the overall model, as depicted in Figure 2. This final model tests the hypotheses proposed at the end of the introduction by specifying the relations among the personality factors, the Generation and Selection factors, and the intensity and achievement factors. Limited by the weak personality sub-model discussed above, the fit of this final, overall model was not very

3 An alternative conceptualization of the Divergence factor was also tested (N, A, C, non-conformism, and distraction). This model resulted in a very poor fit, and this conceptualization of the Divergence factor predicted neither Generation nor Selection processes in the subsequent overall model. Hence, we redefined this factor by excluding the N scale in the following analyses.

4 For example, modification indices suggested adding a cross loading (letting A load on Plasticity) or a residual covariance between O and non-conformism. Unfortunately, setting these parameters free led to estimation issues, notwithstanding the theoretical changes it could have implied in the factor definition. Hence, we kept the original specification in further analyses. Note that we allowed C load both on Divergence and Convergence, because the dual-nature of this variable was expected. (As mentioned in the introduction, it is likely that C has a "work efficiency" aspect that loaded here positively on Convergence, and a "non-impulsive" part, that loaded here negatively on Divergence.)

**FIGURE 2.** Final overall structural equation model of creativity and personality (study 1).

*Note.* All parameters are standardized estimates. Standard errors of estimation are in parentheses; ns = non-significant; *p > .05; **p > .001.
good (last line of Table 2). However, relations between factors make sense and are in line with our initial hypotheses. (See Study 2 for modifications and improvements of this model.)

Specifically, results detailed in Figure 2 show that, as expected, both Plasticity and Divergence predict positively Generation ($\beta = .58$ and $.34$, respectively; overall $R^2 = .45$), whereas Convergence is very closely related to Selection ($r = .78$, $R^2 = .61$). Furthermore, Convergence correlates .67 with Plasticity ($R^2 = .45$). We can also see that the scales we proposed here as a complement to the classical Big 5 factors are very relevant, as their loadings on the higher-order personality factors are among the strongest found. Last, Generation appeared as the only significant predictor of Intensity of everyday creativity ($\beta = .35$, $R^2 = .12$). Generation predicted Achievement of everyday creativity ($\beta = .34$), along with the interaction between Generation and Selection ($\beta = .18$, overall $R^2 = .15$).

This interaction, modest in size but of great theoretical importance, is graphically represented in Figure 3. The first way to interpret this interaction is to consider the changes of the effect of Generation on everyday creative achievement as the scores of Selection vary. The main positive effect of Generation for an average value of Selection is depicted by the grey continuous line in Figure 3. One can see that this effect was stronger when Selection was high (black continuous line, for a hypothetical value of Selection $2SD$ above the average); conversely, it was weakened when Selection was low (dotted black line, for a hypothetical value of Selection $2SD$ below the average). Using the procedure from Preacher, Curran and Bauer (2004), the simple slopes for the corresponding hypothetical value of Selection were calculated. For a person very high on Selection ($+2SD$ above the mean), the simple slope of Generation would be $0.70$ ($SE = .20$, $p = .0009$), whereas for a person very low on Selection ($2SD$ below the mean), the simple slope of Generation would be about $0$ ($\beta = -.009; SE = .20, p = .965$).

This other way to interpret this interaction is to look at the changes of the effect of Selection on everyday creative achievement as the scores on Selection vary. The main effect of Selection, for an average value of Generation, would be virtually null (about $-.13$, non-significant). For a hypothetical person with a score $2SD$ above the mean of Generation, the simple slope value of Selection on creative achievement would be $0.30$ ($SE = 0.20, p = 0.15$). Conversely, for a hypothetical person with a score $2SD$ below the mean of Generation, the simple slope value would be $-0.41$ ($SE = 0.20, p = 0.051$).

In sum, the positive main effect of Generation on creative achievement can be greatly strengthened by high Selection abilities, whereas it can be nullified if Selection is very low. Likewise, the null effect of Selection on creative achievement can become negative in the specific context of low Generation abilities. However, it becomes barely positive even if Generation is high (but see Study 2).

STUDY 2

Study 2 was designed to replicate and extend results of study 1. Specifically, the changes and extensions were the following: (a) personality scales were slightly
modified in order to try to fix some of the problems in study 1 (cross loadings and residual correlations), and ultimately obtain a simpler model with a better fit, (b) a measure of divergent thinking (fluency) was added. More details about these changes are described in the following sections.

Participants and procedure

The sample consisted of 99 first-year undergraduate psychology students at the University of Geneva (85% of women; mean age of 22 years, $SD = 5.4$). Students participated voluntarily and without payment. This study took place in a computer lab. Participants arrived at the lab by groups of 4 to 12, they answered first the questionnaires (personality, creative process, everyday creativity) and then completed the tasks of divergent thinking. All tasks and questionnaires were computerized. The session lasted approximately 20 minutes.
Measures

Personality

The personality variables were the same as in study 1, although some significant changes were implemented. First, only two items were used to measure each basic trait, essentially due to time constraints; for most scales, the selected items were the items identified as the best markers (i.e., with highest loadings) in study 1. Exceptions are the following: (a) the Extraversion items were more focused on dominance than sociability (the items here were “is reserved, withdrawn” (reversed), and “is self-confident, assertive”), (b) the conscientiousness scale was not used; instead a short impulsivity scale was introduced (items were “is impulsive, lacks self-control” and “easily loses one’s temper, can be rude or aggressive”). By implementing these changes, we hoped to diminish the social dimension of Plasticity, which may have caused the tendency of A to load on this factor—sociability, warmth, and agreeableness are actually traits close to each other (John & Srivastava, 1999). Second, we wanted also to clarify the relations between Conscientiousness, Divergence, and Convergence: unlike Conscientiousness, the new impulsivity short scale was supposed to load only on the Divergent factor (and not on Convergence).

Creativity

The measures of Generation and Selection were identical to study 1. As in study 1, everyday creativity was measured using intensity of practice (one item in terms of both seriousness and time spent, that is, “I practice seriously this activity, I spent a lot of time on it”) and achievement (using the five best items of study 1). In comparison to study 1, only 7 activities (the most frequently practiced) were included in this questionnaire.

Additionally, two divergent thinking tasks were used to assess ideational fluency. The first was an unusual uses task (“all of the original and creative uses for a brick”; Guilford, Christensen, Merrifield & Wilson, 1978) and the second was an instances task (“all of the original and creative instances of things that are round”; Wallach & Kogan, 1965). Participants were explicitly instructed to be creative and to give the maximum numbers of ideas that they can generate. Time was not limited.

Data analysis

We proceeded in two steps as in the previous study: (a) three sub-models were separately tested, that is a personality sub-model with 9 first-order factors (e.g., E, O) and 3 second-order factors (Plasticity, Divergence, Convergence); a process sub-model with 2 first-order factors (Generation and Selection); and a creative activity sub-model, also with 2 first-order factors (Intensity and Achievement), (b) first-order factor scores of these models were estimated and used as manifest indicators in the final, integrative model. Additionally, the divergent thinking variable was added as a classic manifest variable (i.e., mean score in the two tasks). A few more differences are worth mentioning: first, in the personality sub-model of this study 2, the raw items were used as manifest variables (in study 1, the lowest level of “manifest” variables
were factor scores saved from previous analysis, not raw items); second, in the process sub-model, the 7 creative activities were used as distinct indicators (in study 1, they were aggregated across the two items of “time spent” and “seriousness”).

Results and discussion

As in study 1, descriptive statistics of all variables are detailed in Table 1. Albeit the number of items used to measure personality was very low, reliability was not too strongly affected. The only noticeable differences concern the Openness and Agreeableness factors, whose reliability are low in this second study (but see next paragraph). Skewness and Kurtosis are all in the range from −1 to 1, suggesting that, in this regard, the way the Intensity factor was measured in this second study was better than in study 1.

The personality sub-model was also improved as compared to study 1 (fit indices available in Table 3). The structure of this model was simpler and showed a better fit. The ambiguity between E and A persisted, although to a lesser extent; one residual correlation was set free between “is reserved, withdrawn” of the E scale and “is cold, distant with people” of the A scale ($r = .57; p < .001$). Moreover, the aforementioned low reliabilities of O and A did not affect their loadings on their respective second-order factor; actually, all second-order loadings were even higher in this second study, suggesting that reliability was not an issue. There are, however, a few important differences between this model and the one of the first study. First, the Distraction scale was not included in this model because it did not load on Divergence anymore; this may be a consequence of a redefinition of Divergence without conscientiousness and with impulsivity instead (see the final discussion for further details). Second, the correlation between Divergence and the two other personality factors was not zero: Divergence had a small positive correlation with Plasticity ($r = .22, p < .01$) and a small negative correlation with Convergence ($r = -.23, p < .01$). These correlations between personality factors may be due to the changes implemented in the variables included in the model. For example, the Extraversion

<table>
<thead>
<tr>
<th>Component</th>
<th>k</th>
<th>df</th>
<th>Param</th>
<th>$\chi^2$</th>
<th>RMSEA (90% CI)</th>
<th>SRMR</th>
<th>CFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personality</td>
<td>18</td>
<td>131</td>
<td>58</td>
<td>216.5</td>
<td>0.081 (0.061; 0.100)</td>
<td>0.102</td>
<td>0.81</td>
</tr>
<tr>
<td>Process</td>
<td>12</td>
<td>51</td>
<td>39</td>
<td>90.4</td>
<td>0.088 (0.058; 0.118)</td>
<td>0.090</td>
<td>0.91</td>
</tr>
<tr>
<td>Creative activity</td>
<td>12</td>
<td>51</td>
<td>46</td>
<td>113.1</td>
<td>0.111 (0.083; 0.139)</td>
<td>0.079</td>
<td>0.86</td>
</tr>
<tr>
<td>Overall</td>
<td>14</td>
<td>73</td>
<td>46</td>
<td>141.3</td>
<td>0.097 (0.073; 0.12)</td>
<td>0.066</td>
<td>0.94</td>
</tr>
</tbody>
</table>

Note. k = number of indicators in the model; df = degree of freedom; param = number of estimated parameters; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean squared Residual; CFI = Comparative Fit Index.
A subscale of Plasticity was more oriented toward dominance, which might explain the positive correlation with Divergence. Indeed, the Extraversion and the Non-Conformism subscales of Divergence correlated positively \((r = .30, p = .003)\).

The process sub-model had an acceptable fit (details in Table 3), although not as good as in study 1, and we had to estimate two additional parameters: a residual correlation between “Evaluate the potential of an idea” and “Formalize an idea” \((r = .54; p < .001)\), as well as a cross loading—the item “Search for improvement” loaded both on Selection and Generation (respectively .68 and .37, both \(p < .001\)). Finally, the fit of the creative activity sub-model (also in Table 3) was similar to its equivalent in study 1. However, in this model, the correlation between intensity and achievement was very high \((r = .89; p < .001)\). This may be due to the simplification of the intensity scale (i.e., one item covering both seriousness of engagement and time spent instead of two items in study 1). Consequently, for the sake of simplicity in the final model, we defined a common “everyday creativity” factor based on the intensity and achievement constructs.

This final model is depicted in Figure 4 and fit indices are detailed in the last line of Table 3. As in study 1, on the left part of the model (i.e., personality and process), Plasticity and Divergence predicted positively Generation \((\beta = .34 \text{ and } \beta = .32\), respectively; overall \(R^2 = .27)\) and Convergence predicted positively Selection, though with a much smaller effect size \((\beta = .23, R^2 = .05)\) as compared to study 1. Overall, in this part of the model, it seems that the predictive validity was a bit lower than in study 1. This may be due to the smaller number of items we used to estimate the personality factors or to the changes we made in the

![Figure 4. Final overall structural equation model of creativity and personality (study 2).](image)

*Note.* All parameters are standardized estimates. Standard errors of estimation are in parentheses; †\(p > .10\); *\(p > .05\); **\(p > .01\); ***\(p > .001\).
The right-hand portion of the model (i.e., process and creative activity) showed important replications as well: Generation had a positive impact on everyday creativity ($\beta = .22; p < .05$); Selection alone had a small positive effect that hardly reached significance ($\beta = .15, p = .09$); the interaction between Generation and Selection had a clear positive effect on everyday creativity ($\beta = .23, p < .01$).

This interaction can generally be interpreted as in study 1, that is both high Generation and Selection are necessary to achieve high creativity, though with a slight difference. For people high on Selection (+2 SD), the simple slope of Generation was positive and significant ($\beta = .68, SE = .22, p = .003$); for people low on Selection (−2 SD), the simple slope was non-significant and thus comparable to zero ($\beta = -.25, SE = .21, p = .16$). These are globally the same results as in study 1 (except that the simple slope for low Selection people was farther from 0). For people high on Generation (+2 SD), unlike in study 1, the simple slope of Selection did reach significance and was positive ($\beta = .61, SE = .17, p = .005$); for people low on Generation (−2 SD), the simple slope was negative and marginally significant ($\beta = -.31, SE = .21, p = .07$), which is comparable to study 1.

Additionally, Generation predicted positively divergent thinking ($\beta = .43, p < .001$), which is an important result in favor of the validity of the Generation scale. Moreover, divergent thinking had also a positive effect on everyday creativity ($\beta = .21; p < .05$). Overall, the $R^2$ for everyday creativity was .21. It is worth mentioning that the effect of Generation on everyday creativity was significant over and above the prediction of divergent thinking, which is an important argument in the favor of the discriminant validity of this scale. In other terms, the Generation scale is positively related to divergent thinking (convergent validity) but it brings important additional information (discriminant validity).

**GENERAL DISCUSSION**

**PERSONALITY FACTORS**

In this paper we have first suggested that three “super-factors” of personality might be of particular relevance for creativity research. These factors are Plasticity, Divergence and Convergence. We now review their specification and meaning in light of the two studies we pursued to investigate their validity.

As a traditional higher-order factor of the Big Five, Plasticity is generally defined by high Extraversion and Openness (DeYoung, 2006; Digman, 1997) and has already been found to relate to creativity (Silvia et al., 2009). In this article, we proposed a slight extension of Plasticity, which also encompassed the concept of inspiration, known to be positively related to Extraversion, Openness, and positive affect (Thrash & Elliot, 2003, 2004). As the inspiration subscale had the highest loading on Plasticity in both studies, we believe that such an extension was highly appropriate.

The specification of the Divergence factor was not as straightforward as for Plasticity. This factor was mainly defined as close to Psychoticism, which roughly means low Conscientiousness and low Agreeableness. Our results were in line with these
findings: conscientiousness loaded strongly and negatively on the Divergence factor in study 1 and Agreeableness loaded negatively in both studies. Moreover, in both studies, the non-conformism scale had a very high loading, suggesting that this trait is central to Divergence, along with impulsivity, which also loaded highly on Divergence in study 2. Unfortunately, the role of the distraction subscale remains unclear. First, it appeared as an important indicator of Divergence along with conscientiousness in study 1. But then, in study 2, when we replaced Conscientiousness by impulsivity to simplify the model and avoid cross loadings, distraction no longer loaded significantly on Divergence. Given that the predictive validity of Divergence was not affected by this change, the final model of study 2 should be preferred for its greater parsimony.

Furthermore, the Divergence factor was also inspired by the Stability factor of higher-order factors of the Big Five (i.e., low Neuroticism, high Agreeableness and Conscientiousness). In study 1, we tested a Stability factor and concluded that it was not very relevant for our purposes: the model fit was very poor and the predictive validity for creativity was null. Hence, we excluded N from the Divergence factor. Although N was not included in the Divergence factor, we could argue that some traits of N were indirectly represented, such as irritability, anger-hostility and impulsivity (especially in study 2). According to McCrae and Costa (1999), those traits are supposed to load mainly on Neuroticism, but Zuckerman et al. (1993) have shown that anger-hostility had a strong negative loading on an Agreeableness factor, whereas impulsivity had a strong negative loading on a Conscientiousness factor (along with Psychoticism).

In sum, we believe that our Divergence factor may be an “augmented” Psychoticism factor that included traits of Neuroticism long known to be ambiguous. For that reason, Divergence may be similar to schizotypy which has both Psychoticism and Neuroticism components (Eysenck, 1992a). Furthermore, these ambiguous traits of Neuroticism (i.e., impulsivity, irritability, anger, hostility, instability) may be more important for creativity than the more “traditional” Neuroticism traits such as depression and anxiety. Indeed, a recent study by Silvia and Kimbrel (2010) has shown that depression and anxiety are virtually unrelated to various measures of creativity, whereas cyclothymia and affective disorders based on instability of affect—and not solely on negative affect—are known to be positively related to creativity (Richards, Kinney, Lunde, Benet & Merzel, 1988).

Finally, we proposed a third factor, Convergence, based on high conscientiousness, persistence, precision and critical sense. We have found that Convergence was strongly and positively correlated with Plasticity, probably because the two share a high-energy component (i.e., inspiration and persistence both imply high-energy levels). Nonetheless, this high correlation may question the discriminant validity of the Convergence factor. It is possible that the only unique variance of this factor (i.e., distinct form Plasticity) is achievement motivation and/or critical sense—which may not be enough to construct a meaningful second-order factor. An important question for future research consists of clarifying the legitimacy, specification and relevance of this Convergence factor.
OVERALL MODEL

In our integrative model, Plasticity and Divergence was hypothesized to predict Generation processes. In both studies, results consistently supported this prediction. We should emphasize that Plasticity and Divergence each predicted a unique part of the variance of Generation. This suggests that there are two different paths to Generation; both are important and specific, with cumulative effects.

Second, Convergence was hypothesized to predict Selection processes. Our results supported this prediction, although the discrepancy of effect sizes between study 1 and 2 was important. The very strong relation found between Selection and Convergence in study 1 (β = .78) might question the discriminant validity of Convergence as it was defined in this study. Conversely, in study 2, the strength of this relation was much more modest (β = .23). It is possible that this decrease was due to the exclusion of the Conscientiousness factor. This would suggest that Conscientiousness is central to Convergence’s predictive validity.

Additionally, in this second study, the effect of Plasticity on Generation was also lower (β = .34 vs. β = .58). Hence, generally speaking, effect sizes that were theoretically important shrunk quite strongly from study 1 to study 2. As we have seen that reliability and loadings were not drastically different across the two studies, one possible explanation is an important loss in conceptual breadth; it is probable that using only 2-items short scales impoverished the variety of underlying behaviors assessed by Plasticity and Convergence (whereas Divergence was astonishingly immune to this problem). Nonetheless, as the fit of the final model is much better in study 2, this makes it probably more trustworthy overall.

Finally, Generation and Selection processes were hypothesized as important predictors of everyday creativity. Although the overall prediction of these two scales was modest, the significant and meaningful effects we found indicate their acceptable predictive validity. Generation predicted positively everyday creativity and divergent thinking, whereas the main effect of Selection did not reach significance. Most importantly, and as expected, the interaction between Selection and Generation was a significant predictor of everyday creativity (achievement in particular, as shown in study 1).

This interaction was such that the general positive impact of Generation was stronger when coupled with high Selection abilities. Moreover, very low Selection levels could have potentially nullified the effect of Generation. To our knowledge, this is the first study to test and find such an interactive effect, although many speculations about the importance of the interaction between these two kinds of processes exist (e.g., Lubart, 2000; Runco, 2003). This interaction showed also that high levels of Selection could be detrimental to creativity when Generation is low. This result is consistent with popular techniques used to enhance creativity such as brainstorming, which recommend lowering Selection in order to achieve higher creativity. The present results are moderate, however, the enthusiasm for such practices, suggesting that they are relevant only for people low on Generation. For people high on Generation, based on our results, we would rather recommend strengthening Selection processes to achieve higher creativity.
LIMITATIONS AND POSSIBLE FUTURES STUDIES

The main limitation of our study is undoubtedly the relatively small samples. As we tested quite complex models, estimations sometimes lacked precision (yielding large confidence intervals). Nevertheless, several parameter estimates were statistically different from zero. Additionally, we must acknowledge that our samples were also quite specific, composed mostly of young undergraduate women, hence not representative of the general population. For these reasons, results found and discussed here require replications. In particular, it would be of great interest to test the proposed model in larger, more “creative” samples, tapping in different domains, as well as at various levels of achievement.

Another limitation is that we use simple, short scales. Though this choice was motivated to avoid detrimental effects due to a very large number of measures, in the future our results should be replicated using more intensive measures, such as various personality scales of the Big Five and other well-established psychological scales (psychobiological in particular, such as the one of Eysenck or Zuckerman). More generally, we should also acknowledge that our results are mainly based on self-report measures of creativity, which may be measuring perception of creativity. Although a recent study by Silvia, Wigert, Reiter-Palmon and Kaufman (2012) has shown evidence in favor of the validity of such instruments, the risk of a mono-method bias remains a potential limitation to this study. To clarify this issue and strengthen the present results, future studies should include a measurement of objective creative performance. Additionally, more experimental cognitive tasks might be incorporated in an attempt to replicate these results. For example, it might be expected that the Generation scale correlates negatively with latent inhibition and positively with the Remote Association Task (Mednick & Mednick, 1967). For Selection, predictions are harder to make, but probably this scale should be positively related to problem solving tasks or tasks involving evaluation skills such the ability to judge relatedness between concepts (Vartanian, Martindale & Matthews, 2009). More generally, Selection might also just be positively associated with general intelligence, given that general intelligence is related to creativity (Nusbaum & Silvia, 2010) and most certainly useful when it comes to evaluate whether a specific idea is relevant, appropriate or requiring improvement.

FINAL REMARKS AND CONCLUSION

The overall model proposed here is highly inspired by past research and, we believe, provides a parsimonious structure that synthesizes it quite well. Indeed, the Plasticity-Divergence-Generation “network” represents most classical known relations between creativity and personality: the positive impact of openness (Feist, 1998; McCrae, 1987), extraversion and dominance (Batey & Furnham, 2006; Feist, 1998), positive affect (Baas et al., 2008; Feist, 1998), inspiration (Thrash & Elliot, 2003, 2004), hypomania (Richards et al., 1988; Schuldberg, 2000; von Stumm, Chung & Furnham, 2011), psychoticism (Batey & Furnham, 2006; Eysenck, 1993), and schizotypy (Kinney et al., 2001; Schuldberg, 2000). It is very likely that the
common denominator between all these variables is reduced latent inhibition, which is related to Plasticity (Peterson, Smith & Carson, 2002) as well as to Psychoticism and schizotypy (Eysenck, 1992a).

In the history of creativity and personality research, the variables underlying the Convergence-Selection axis have received notably less attention than the rest of the model, although there are some important exceptions (e.g., Brophy, 2000; Cropley, 2006; Kirton, 1976; Runco, 2003). In this paper, we have shown that Selection had virtually no main direct effect on creativity, but that an important interactive effect with Generation does exist. Though we are far from a complete understanding of these Convergence-Selection variables, we do believe in their relevance, in particular to better understand high creative achievement or any serious, realistic, functional manifestation of creativity.

REFERENCES


**APPENDIX**

Personality Items of the New Scales in Study 1

<table>
<thead>
<tr>
<th>Original items</th>
<th>English translation</th>
<th>Corresponding scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passionné</td>
<td>Passionate</td>
<td>Inspiration</td>
</tr>
<tr>
<td>Actif, dynamique</td>
<td>Active, dynamic</td>
<td>Inspiration</td>
</tr>
<tr>
<td>Transporté, motivé</td>
<td>Moved, motivated</td>
<td>Inspiration</td>
</tr>
<tr>
<td>Inspiré</td>
<td>Inspired</td>
<td>Inspiration</td>
</tr>
<tr>
<td>Non-conformiste</td>
<td>Non-conformist</td>
<td>Non-conformism</td>
</tr>
<tr>
<td>Rebelle, iconoclaste</td>
<td>Rebellious, maverick</td>
<td>Non-conformism</td>
</tr>
<tr>
<td>Bizarre, excentrique</td>
<td>Weird, eccentric</td>
<td>Non-conformism</td>
</tr>
<tr>
<td>Pensif, méditatif</td>
<td>Pensive, Meditative</td>
<td>Distraction</td>
</tr>
<tr>
<td>Rêveur, songeur</td>
<td>Dreamer</td>
<td>Distraction</td>
</tr>
<tr>
<td>Distrait</td>
<td>Distracted</td>
<td>Distraction</td>
</tr>
<tr>
<td>Intellectuel</td>
<td>Intellectual</td>
<td>Critical Sense</td>
</tr>
<tr>
<td>Critique</td>
<td>Critical</td>
<td>Critical Sense</td>
</tr>
<tr>
<td>Réfléchi</td>
<td>Thoughtful</td>
<td>Critical Sense</td>
</tr>
<tr>
<td>Attaché aux details</td>
<td>Concerned by details</td>
<td>Precision</td>
</tr>
<tr>
<td>Perfectionniste</td>
<td>Perfectionist</td>
<td>Precision</td>
</tr>
<tr>
<td>Exigeant</td>
<td>Exacting</td>
<td>Precision</td>
</tr>
<tr>
<td>Persévérant</td>
<td>Persistent</td>
<td>Persistence</td>
</tr>
<tr>
<td>Déterminé</td>
<td>Determined</td>
<td>Persistence</td>
</tr>
<tr>
<td>Vite découragé</td>
<td>Easily discouraged</td>
<td>Persistence (keyed negatively)</td>
</tr>
</tbody>
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