The Spanish Journal of Psychology
2007, Vol. 10, No. 2, 294-302

ISSN 1138-7416

Influence of Impulsivity-Reflexivity when Testing Dynamic Spatial Ability: Sex and *g* Differences

Mª Ángeles Quiroga[1], José Manuel Hernández[2], Victor Rubio[2], Pei Chun Shih[2], and José Santacreu[2]
[1]Universidad Complutense de Madrid
[2]Universidad Autónoma de Madrid

This work analyzes the possibility that the differences in the performance of men and women in dynamic spatial tasks such as the Spatial Orientation Dynamic Test-Revised (SODT-R; Santacreu & Rubio, 1998), obtained in previous works, are due to cognitive style (Reflexivity-Impulsivity) or to the speed-accuracy tradeoff (SATO) that the participants implement. If these differences are due to cognitive style, they would be independent of intelligence, whereas if they are due to SATO, they may be associated with intelligence. In this work, 1652 participants, 984 men and 668 women, ages between 18 and 55 years, were assessed. In addition to the SODT-R, the "Test de Razonamiento Analítico, Secuencial e Inductivo" (TRASI [Analytical, Sequential, and Inductive Reasoning Test]; Rubio & Santacreu, 2003) was administered as a measure of general intelligence. Impulsivity scores (Zi) of Salkind and Wright (1977) were used to analyze reflexivity-impulsivity and SATO. The results obtained indicate that (a) four performance groups can be identified: Fast-accurate, Slow-inaccurate, Impulsive, and Reflexive. The first two groups solve the task as a function of a competence variable and the last two as a function of a personality variable; (b) performance differences should be attributed to SATO; (c) SATO differs depending on sex and intelligence level.
Keywords: dynamic spatial tasks, reflexivity-impulsivity, speed-accuracy tradeoff, sex differences, intelligence

El trabajo analiza la posibilidad de que las diferencias en la ejecución de varones y mujeres en tareas espaciales dinámicas como el Spatial Orientation Dynamic Test-Revised (SODT-R Santacreu y Rubio, 1998), obtenidas en trabajos previos, se deban al estilo cognitivo (Reflexividad-Impulsividad) o al balance velocidad-exactitud; (Speed-Accuracy Trade-Off, SATO) que los participantes pongan en marcha. De deberse al estilo cognitivo serían independientes de la inteligencia mientras que si se deben al balance Velocidad-Exactitud pueden estar asociadas a la inteligencia. Se evaluó a 1652 participantes, 984 varones y 668 mujeres, de edades comprendidas entre 18 y 55 años. Además del SODT-R se administró el Test de Razonamiento Analítico, Secuencial e Inductivo (TRASI; Rubio y Santacreu, 2003) como medida de inteligencia general. Para el análisis de la Reflexividad-Impulsividad (R-I) y el balance velocidad-exactitud se utilizaron las puntuaciones de impulsividad (Zi) de Salkind y Wright (1977). Los resultados obtenidos indican que: a/ se pueden identificar cuatro grupos de ejecución: Rápidos-exactos, Lentos inexactos, Impulsivos y Reflexivos. Los dos primeros resuelven la tarea en función de una variable competencial y los dos últimos en función de una variable de personalidad; b/ las diferencias en la ejecución deben atribuirse al balance VE; c/ este balance es diferente según el sexo y el nivel de inteligencia.
Palabras clave: tareas espaciales dinámicas, reflexividad-impulsividad, balance velocidad-exactitud, diferencias entre sexos, inteligencia

Correspondence concerning this article should be addressed to José Santacreu Mas, Facultad de Psicología, Universidad Autónoma de Madrid, C/ Pavlov, 6, 28049 Madrid (Spain). E-mail: jose.santacreu@uam.es

Translation: Virginia Navascués Howard.

In the pioneer work of Pellegrino and Hunt (1989), dynamic spatial tasks are described as those in which the subjects must predict where the moving object is heading and when it will reach its destination. Santacreu and Rubio (1998) developed two dynamic spatial tasks to assess orientation—the Spatial Orientation Dynamic Test (SODT-R)—and visualization—the Spatial Visual Dynamic Test (SVDT). In the dynamic spatial orientation task, the deviation from the destination point was used as the efficacy criterion, so that a superior performance directs the moving object in a smaller angle with regard to the destination. Men perform better than women (Contreras, Colom, Shih, Álava, & Santacreu, 2001) as is also noted in static spatial aptitude tasks (Voyer, Voyer, & Bryden, 1995). In order to understand these differences, a series of performance factors, considered response tendencies, were proposed, which can be measured only when the task can be performed in different ways (Goldstein, Haldane, & Mitchel, 1990). Contreras, Rubio, Peña, Colom, and Santacreu (in press) analyzed the performance factors: response latency (RL), response frequency (RF), and invested time (IT). The results showed that men surpassed women in each one of these aspects. That is, the men have higher RLs (d = .51), lower RFs (d = –.56), and lower ITs per problem (d = –.56), and they deviated less, that is, they directed the moving objects better (d = –.81). Moreover, these authors showed that these four performance variables are related to each other both in men and women, which supports the consideration that the task measures the same variable in both sexes ($r_{Dev.-RL}$ = –.307 in women and –.199 in men; $r_{Dev.-RF}$ = .257 in women and .302 in men; $r_{Dev.-IT}$ = .411 in women and .288 in men; r_{RL-RF} = –.732 in women and –.602 in men; r_{RL-IT} = –.544 in women and –.301 in men; r_{RF-IT} = .565 in women and .456 in men). The extent of the association among these performance variables was statistically significant in men and women, except for the deviation-response frequency (RF) pair. This led to the conclusion that the relations among the performance factors and spatial performance are not the same in men and in women (Contreras et al., in press).

Number of errors and RL were used as criteria in the operationalization of cognitive reflexivity-impulsivity, as a performance style (Kagan, 1966; Cairns, & Cammock, 1978), and in the analysis of SATO applied to the psychometric aptitude tests (Phillips & Rabbit, 1995). Impulsive people respond quickly (low RLs) but they make many mistakes, whereas reflexive people take longer to respond but do not make hardly any mistakes. Likewise, emphasis on speed leads people to respond quickly (practically completing all the items of a performance test such as the Primary Mental Abilities (PMA; Thurstone, 1938), partially sacrificing accuracy, whereas emphasis on accuracy leads to sacrificing speed (leaving many unresponded items). In the case of the reflexivity-impulsivity cognitive style, dichotomization by the median of both criteria allows us to obtain the four groups into which people can be classified by their performance on visuo-spatial tasks with uncertainty responses (such as the Matching Familiar Figures Test (MFFT; created by Kagan in 1966 to assess the reflexivity-impulsivity cognitive style): impulsive (I), reflexive (R), fast-accurate (FA), and slow-inaccurate (SI) (Davies & Graff, 2006; Quiroga & Forteza, 1988; Salkind & Wright, 1977). The data show that both in the case of the reflexivity-impulsivity cognitive style and in SATO, the individual's performance can be described either as a function of the dimension of style or ability. This means that some people solve cognitive tasks basically using their abilities (FA and SI) whereas other individuals are more influenced by their cognitive style (I and R), so that their task performance is impaired. This observation allows us to analyze SATO in any cognitive task in which time is relevant to task performance (Bizot & Thiébot, 1996). The difference between cognitive style and SATO is that cognitive style reflects a way of perceiving, attending, or recalling (for an extensive review, see Quiroga, 1988; and a synthesis in Quiroga, 1999), whereas SATO reflects a way of responding that is attributed to personality characteristics such as impulsiveness or cautiousness (Dennis & Evans, 1996).

Given that men and women differ in their performance on the SODT-R and in the relationship between RL and deviation (amount of error), and that the performance variables do not sufficiently explain these differences (Contreras et al., in press), the reflexivity-impulsivity cognitive style may account for the differences or, as another possibility, men and women can differ in the SATO they apply to solve the task. Emphasis on accuracy is not always associated with better performance and emphasis on speed is not always related to poorer performance but instead, performance will depend on task requirements. In daily life, people not only need to be accurate but also to be accurate with some speed. Therefore, a persistent cognitive style (whether it be Reflexivity or Impulsivity) may be an obstacle in some real life situations.

The *Z*i score, proposed by Salkind and Wright (1977), is usually used to obtain in a single index the amount of reflexivity-impulsivity displayed during the performance. This score has been used extensively ever since in research because of the advantage of having a single index that combines RL and error (Buela-Casal, Carretero-Dios, De los Santos-Roig, & Bermúdez, 2003; Dunber, Hill, & Lewis, 2001; Kenny, 2005; Morgan, 1998; Overton, Byrnes, & O'Brien, 1985; Servera & Llabrés, 2000; Waring, Farthing, & Kidder-Ashley, 1999). The *Z*i score is calculated by subtracting the standardized score of the mean RL from the standardized score of the number of errors committed ($Zi = Z_e - Z_{RL}$). When SATO is used to analyze performance in classic psychometric tasks such as the PMA (Thurstone, 1938), the *Z*i score is obtained from the speed (the number of problems attempted in the time allotted to task performance) and the percentage of accuracy (the result of dividing the number of hits by the number of problems attempted and multiplying by 100) (Phillips & Rabbitt, 1995). Thus: $Zi = Z_{speed} - Z_{percentage\ of\ accuracy}$. In both cases, the meaning is the same, positive scores reflect impulsivity or preference for speed, and negative scores reflexivity or preference for accuracy.

The studies of cognitive reflexivity-impulsivity, using the Matching Familiar Figure Test (MFFT-20; Cairns & Cammock, 1978), show that, like any other cognitive style (Witkin, 1959), it is not associated with differences in general ability but instead with different ways of processing information that lead to accurate performance when the task requirements coincide with the person's preferred method of processing information. In terms of coding, some studies (see Quiroga & Rodríguez, 2001) suggest that impulsive people carry out incomplete coding of the task requirements because they are in a hurry to finish. In contrast, reflexive people systematically check all the task characteristics before responding. This is what Davies and Graff (2006) found when they studied the relation between global-analytic style and reflexivity-impulsivity. One of the explanations implies that reflexive people are slower but more accurate because they feel anxious about committing errors, whereas impulsive people are fast but inaccurate because the task provokes anxiety about their competence to solve it (Yap & Peters, 1985). These hypotheses were verified with children from 8 to 11 years of age but they may also explain differences in adults.

With regard to men's and women's performance, no systematic sex differences were obtained in reflexivity-impulsivity (Buela-Casal et al., 2003; Malle & Neubauer, 1990; Quiroga & Forteza, 1988) although the studies that use the MFFT-20 (Cairns, & Cammock, 1978) have only examined children up to 12 years of age (for an exhaustive review, see Quiroga & Rodríguez, 2001). However, researches on impulsivity as a personality trait, have frequently reported that men are more impulsive than women (Bettencourt & Millar, 1996; Waldeck & Miller, 1997), although other works have not found these relations (Hoaken, Shaughnessy, & Pihl, 2003; Smith, Waterman, & Ward, 2006). In any case, most of these studies have used questionnaires, and the correlation between objective and subjective measures of impulsivity has not yet been sufficiently established (Enticott, Ogloff, & Bradshaw, 2006; Lane, Cherek, Rhodes, Pietras, & Tcheremissine, 2003; Malle & Neubauer, 1990; Phillips & Rabbitt, 1995).

This work has the following hypotheses: First, sex differences found in dynamic spatial tasks are due to the different SATO observed in men and women, replicating the findings of Contreras et al. (in press). Second, there will be no correlation between impulsivity (operationalized as *Z*i score) and intelligence; that is, participants' performance in a dynamic spatial task will reflect differences in cognitive style. Third, if cognitive impulsivity is independent of intelligence, the findings will be reproduced to the same degree in both sexes.

Method

Participants

The sample was made up of 1.652 candidates for a training course as air traffic controllers (ATC). All of them were university graduates, a prerequisite to take part in the selection process. Of the total sample, 984 were men and 668 were women. The participants' mean age was 28 years (SD = 3.95), with an age range of 18 to 55 years. The men's mean age was 28.34 years (SD = 4.09) and the women's was 27.99 (SD = 3.74), so they can be considered equivalent, $t(1650, N = 1652) = 1.87$, $p = .061$.

Instruments

The SODT-R (Santacreu & Rubio, 1998). This is a computerized test in which participants are requested to direct two moving dots, a red one and a blue one, towards a specific destination, as represented in Figure 1. To change the course of these moving dots, participants must press the corresponding buttons at each side of the two moving dots.

The program sets an original position and a course for the dots that can be modified by pressing the arrow buttons. If the course is not modified, the dot advances across the screen according to the course specified in the configuration. Participants can make each dot turn left or right by clicking the mouse on the respective course arrow buttons. The two dots and their courses can be seen on the screen. The course is a grey dot that indicates where the dot was previously and it helps the participant to estimate the current course of the dot. The test comprises 4 training trials and 9 assessment trials and the participants have 20 s in each trial to modify the course of the two moving dots. The program records the data of the sequence of responses (pressing the buttons to change the course of the dots) of each trial and the moment when the responses are performed, thus obtaining the RL of the first response; that is, time gone by since the beginning of the trial until the first response of the sequence. The total number of presses performed by the participant to orient the dots towards their destination is the RF and IT is the time interval between the first and the last press in a trial. The test calculates the deviation, expressed in degrees, between the course of each of the moving dots at the end of the trial and the course it should have taken to reach its destination. The mean deviation is the result of the test. In Contreras et al. (in press), a precise description of the task and a detailed analysis of the processes involved can be found. The test presents an internal consistency (Cronbach's alpha) of .85 (Colom, Contreras, Shih, & Santacreu, 2003). In terms of validity, it correlated with dynamic and static spatial orientation tests such as the Eliot-Donnelly B-F test (Eliot & Donnelly, 1978), the Surface Development (Thurstone & Thurstone, 1949), or the Maps (Juan-Espinosa, Abad, Colom, &

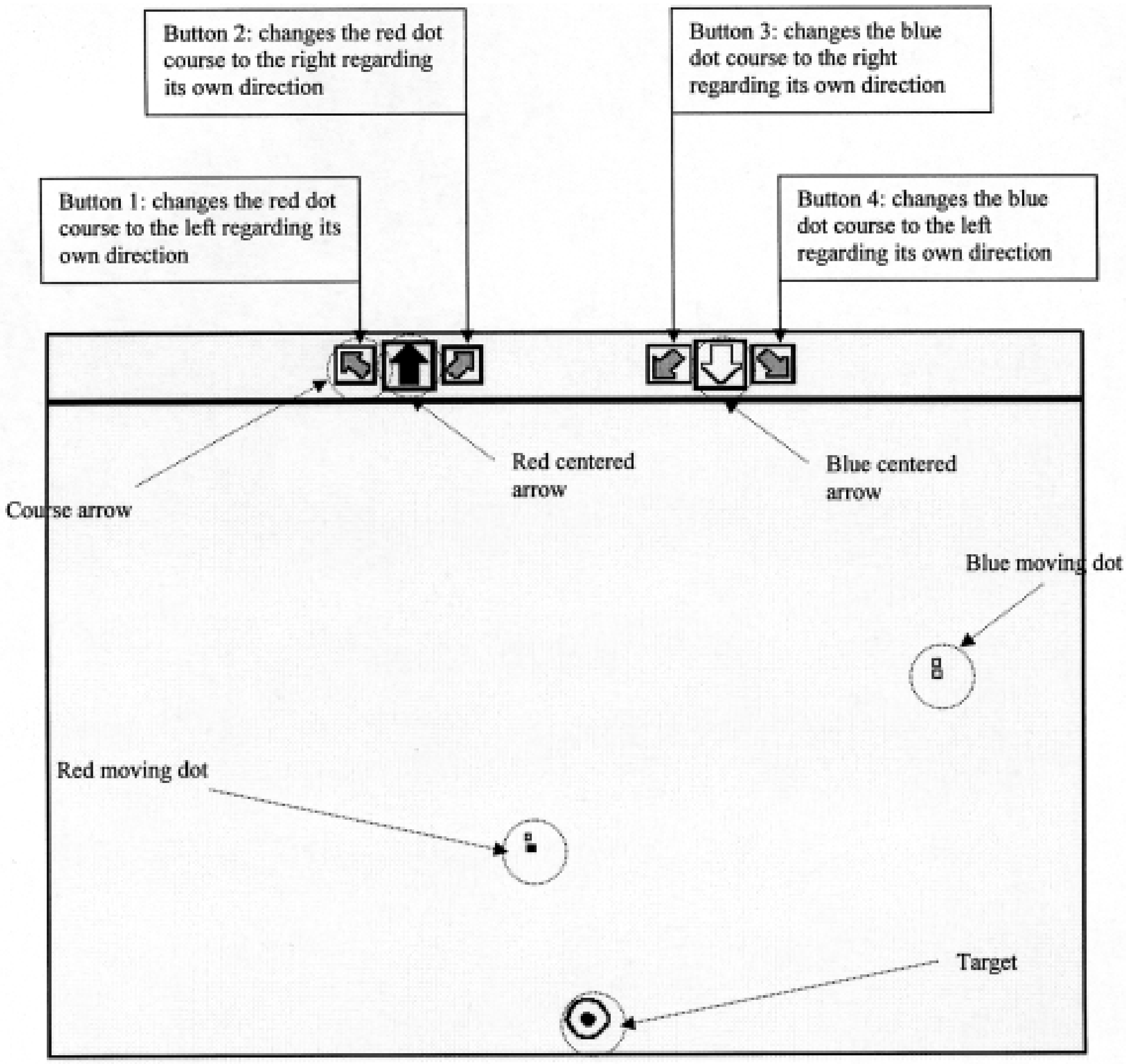

Figure 1. Example of a trial from the Spatial Orientation Dynamic Test-Revised (SODT-R).

Fernández-Truchaud, 2000), presenting correlations of r = .54, .49, and .41, respectively, with these tests.

"Test de Razonamiento Analítico, Secuencial e Inductivo" (TRASI [Analytical, Sequential, and Inductive Reasoning Test]; Rubio & Santacreu, 2003). This is a general intelligence test (*g* factor). It comprises 30 items that represent a logical series of four elements that participants should complete with one of four response options. Only one of these options is correct. Each item has 3 or 4 subelements, depending on its complexity, which, in turn, have several components (from 1 to 4). The reasoning rule used by respondents to obtain the correct solution is established from these components and this rule determines the evolution of the series. Test reliability with Cronbach's alpha was .81 (Rubio & Santacreu, 2003). Regarding criterion validity, the correlation obtained with the Progressive Matrices (Raven, 1965) was .77 and with Cattell's G Factor Test (Cattell, 1971) was .78.

Procedure

Participants completed the spatial orientation test and the intelligence test as part of the assessment battery in the selection process. Tests were administered individually, with each participant working at a computer. The data were processed and analyzed with the SPSS 12.0 statistical package.

Results

Replication of the Findings of Contreras et al. (in press)

In Table 1 are included the means, standard deviations, and effect sizes for the comparison of men and women in the two performance variables.

The results indicate, as in Contreras et al. (in press), that the men presented higher mean RLs than the women (0.23 seconds more) but less deviation (23º less). As can be seen in Figure 2, this different performance was constant over the 9 trials (averaging both moving dots). Therefore, the differences between men and women are not limited to the trial mean but instead their performance pattern in the sequence of trials is parallel, showing the difference in magnitude of the deviation in all the trials.

The values of the correlation between RL and deviation differed in the sign for men (r = .005) and women (r = –.106), and were quite different in magnitude from the values obtained by Contreras et al. (in press). In view of this, we analyzed the scatter plot and observed a nonlinear relation between RL and deviation, so we examined the possible square or cubic relation between both variables (Figure 3). Both for men and women, either the square or the cubic relation fits the observed data better than a linear relation (R_{women} = .341 and .365; R_{men} = .283 and .317). In both cases, the relation was statistically significant (p < .0001) although the cubic estimation was slightly higher both in women and in men.

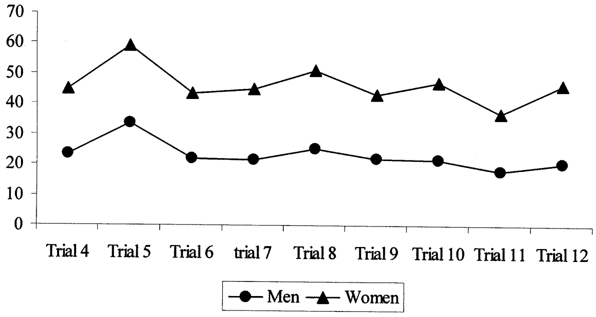

Figure 2. Trial-by-trial analysis of performance (deviation scores) for men and women (all differences are statistically significant for p < .0001, assuming unequal variances).

The two diagrams represent the existence of four ways of responding, which are typical of the so-called modal types (Buss & Poley, 1976), although this is more clearly observed in the women's Scatter plot: one group of participants with short RLs and high deviation; one group with short RLs and low deviation; one group with long RLs and high deviation; and one group with long RLs and low deviation. These four

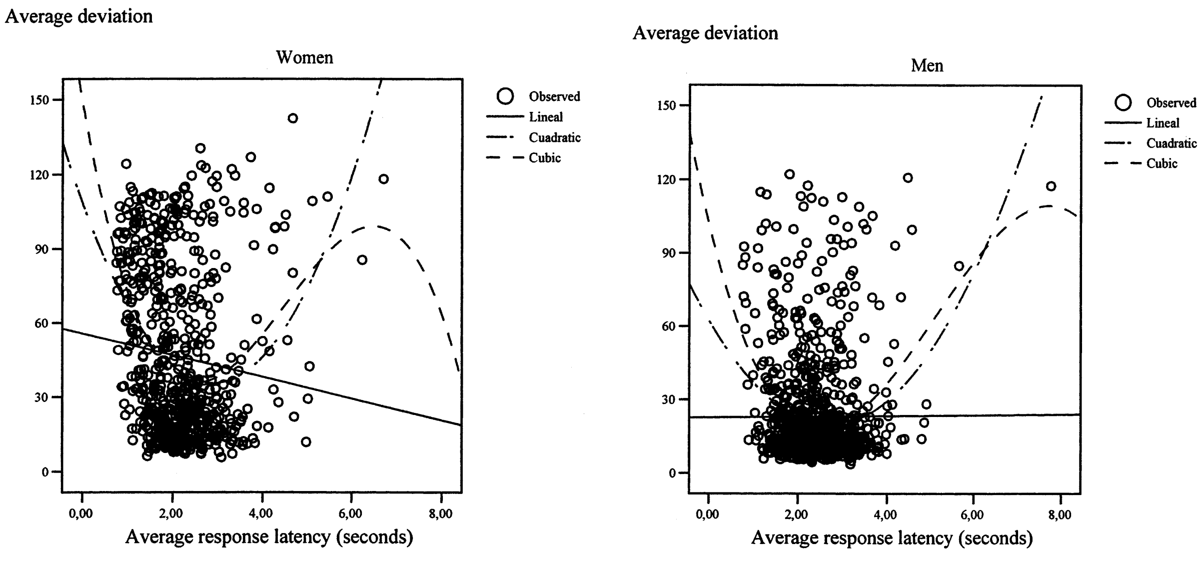

Figure 3. Scatter plot for men and women between average response latency and average deviation score including linear, quadratic, and cubic relationships.

Table 1
Descriptive Statistics and Cohen's d for Average Response Latency (in Seconds) and Average Deviation Score (in Degrees)

	Females (N = 668)		Males (N = 984)		
	M	*SD*	*M*	*SD*	*d*
Deviation Score	46.25	34.09	23.01	21.95	–.85
Response Latency	2.15	0.82	2.38	0.66	.41

groups correspond to what in research is called reflexivity-impulsivity: impulsive, fast-accurate, slow-inaccurate, and reflexive, respectively (Quiroga & Forteza, 1988). In the Discussion section, we will comment upon the issue of the difference in the magnitude of the relation between deviation and RL in the data of Contreras et al. (in press) and our data.

Therefore, the cubic relation between RL and deviation, statistically significant both for men and women, supports the conjoint analysis of both variables, as well as the verification of whether the performance differences between men and women on the SODT-R are reflecting differences in style or simply differences in emphasis on speed in contrast to emphasis on accuracy.

Relation between Intelligence and the Reflexivity-Impulsivity Dimension

We calculated the *Z*i score according to the proposal of Salkind and Wright (1977), for the spatial task (SODT-R) and we correlated it with performance in the intelligence test (TRASI). Both aspects were related ($r_{Zi\text{-}G}$ = –.267, $p < .0001$; corrected with attenuation correction –.333), indicating that the higher the intelligence, the lower the impulsivity, although the magnitude of the correlation was low. Therefore, lower RL and higher deviation (impulsivity) cannot be attributed to a cognitive style because, in that case, it should be independent of intelligence, as mentioned above. This occurred both in men ($r_{Zi\text{-}G}$ = –.197, $p <$ .0001; corrected with attenuation correction –.246) and in women ($r_{Zi\text{-}G}$ = –.285, $p < .0001$; corrected with attenuation correction –.356). Moreover, the difference in the correlations was statistically significant (Z = 1.86, $p < .05$) so that in the women, the magnitude of the association was greater. Therefore, performance differences on the SODT-R are not reflecting a cognitive style and the differences between men and women cannot be attributed to this.

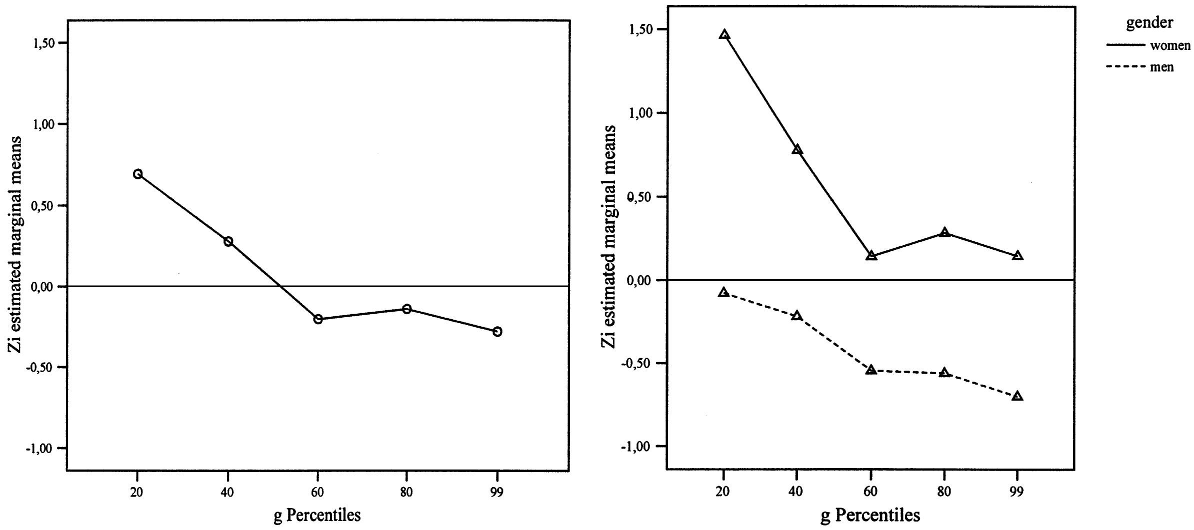

Figure 4. Means of relative impulsivity (*Z*i) shown in performing the SODT-R according to g percentiles for the whole group (left) and for men and women (right).

Table 2
*Means and Standard Deviations of Z*i *Scores for Men and Women According to g Percentiles (Last Row Shows Student's t for Unequal Variances)*

	Men			Women			
g percentiles	*M*	*SD*	*N*	*M*	*SD*	*N*	*t*
20	–0.077	1.299	165	1.465	1.741	160	9.029***
40	–0.218	1.315	211	0.778	1.674	166	6.289***
60	–0.545	1.237	134	0.144	1.640	114	3.683***
80	–0.561	1.053	236	0.284	1.478	125	5.674***
99	–0.701	0.831	237	0.146	1.311	103	6.049***
Total	–0.438	1.160	983	0.645	1.677	668	

** $p < .005$. *** $p < .0001$.

Influence of Intelligence and Sex on Performance on the SODT-R

The results of the ANOVA show that, as expected because of previous works, there were statistically significant differences in sex, $F(1, 1651) = 204.78$, $p < .0001$, $\eta^2 = .111$; intelligence, $F(4, 1647) = 28.88$, $p < .0001$, $\eta^2 = .066$); and their interaction, $F(4, 1647) = 4.64$, $p < .005$, $\eta^2 = .011$. In Table 2 are displayed the means, standard deviations, and Student's *t* statistics for men and women according to intelligence percentile.

Figure 4 shows the progressive decrease in impulsivity as intelligence increases, for the whole group and for each sex.

All the comparisons between the sexes for each level of g were statistically significant ($p < .001$); women displayed a performance with more emphasis on speed at each level of intelligence. In the intergroup comparisons according to intelligence (using Dunnett's C), an effect of progressive decrease up to percentile 60 was produced, and from that point on, the groups did not differ. That is, the groups of lower intelligence (P20 and P40) were different from each other and from all the other groups, whereas starting at percentile 60, the groups presented a similar level of SATO.

Figure 4 and the values of the ANOVA show that: (a) the performance that emphasizes speed decreases as intelligence increases; (b) women display a performance with more emphasis on speed than do the men; and (c) there is an interaction between sex and intelligence in the way participants solve the SODT-R, so that the largest differences between men and women were observed at the lowest intelligence levels (P20 and P40), whereas, starting at P60, differences between men and women remain the same. Moreover, in women, higher intelligence led to less emphasis on speed, whereas in the men, higher intelligence led to more emphasis on accuracy (because the *Z*i variable is in standardized units, so a score of 0 reflects the mean tendency for the evaluated group on SATO), because the men's scores were always lower than the mean, whereas the women's were always higher than the mean.

Discussion

With regard to our first hypothesis, the results obtained in this work coincide with those found by Contreras et al. (in press), that is, men obtain longer RL's but better performance (less deviation) that women in a dynamic spatial task such as the SODT-R. However, as we will comment upon below, these differences should not be attributed to differences in cognitive style, but rather to differences in SATO. Thus, women tend to favor response speed whereas men tend to favor accuracy. This result contrasts with the bibliography about impulsivity as a trait that reports higher impulsivity in men (Bettencourt & Millar, 1996; Waldeck & Miller, 1997), or the absence of differences (Hoaken et al., 2003; Smith et al., 2006). This leads us to indicate two considerations: (a) in the bibliography on differences between men and women in impulsivity, results are based on self-report measures, and (b) there are no consistent data about the relation between subjective and objective measures of impulsivity (Enticott et al., 2006; Lane et al., 2003; Malle & Neubaer, 1990; Phillips & Rabbitt, 1995).

Hence, the independent analysis of the RL and deviation in spatial orientation is insufficient to explain the different performances of men and women because these variables may have different determinants. The work of Contreras et al. (in press) presents higher linear correlation values between deviation and RL than those obtained in this work. This can be explained because of the possible contamination of the linear association indexes (such as Pearson's correlation) that may mask the effect of an underlying characteristic that modulates the relation between the variables. As noted in the introduction, if we find a differential performance between the individuals who solve the task as a function of their abilities (fast-accurate and slow-inaccurate) and those who solve it as a function of their SATO (impulsive and cautious), the linear relation between RL and deviation, which it is affected by this dimension, approaches zero. Given that, in effect, in this work, the correlation values between RL and deviation are very close to zero, there is some underlying characteristic that modulates this relation. Therefore, the specific SATO of each individual can help us to understand his or her performance in spatial orientation.

In view of this circumstance and of the possibility of finding people belonging to the four groups (fast-accurate, slow-inaccurate, impulsive, and cautious), we propose the use of cubic relations, which better capture the relation between RL and deviation in the dynamic spatial orientation task found in our data. In this sense, the *Z*i scores created by Salkind and Wright (1977) have proven to be very useful to gather in a single score this particular SATO. One of the main characteristics of these scores is that they are independent of intelligence, as long as the performance on which they are calculated shows differences in cognitive style.

This leads us to the discussion of the results obtained with regard to our second hypothesis. The results, in contrast to what was hypothesized, show the existence of an inverse relation between intelligence and impulsivity (measured through the *Z*i scores). This relation indicates that the differences obtained in task performance cannot be attributed to differences in cognitive style because, in that case, as mentioned, the *Z*i scores should have been independent of intelligence. Moreover, the effect of the variable intelligence on performance speed (SATO) is revealed in the lower values of the distribution of the intelligence scores. Thus, individuals with lower intelligence scores (percentiles 20 and 40) are the ones who place higher emphasis on speed, whereas at higher levels of intelligence, the tendency to act hastily appears less frequently.

With regard to our third hypothesis, we found a variable response pattern for each sex. This is explained by the inverse relation found between impulsivity and intelligence. Although, both in men and in women, the mean speed decreased as the intelligence score increased, there was no homogeneous pattern in the groups, either in the amount of decrease or the intelligence percentile at which the decrease began. This indicates the existence of an interaction effect between sex and intelligence that shows that intelligence is not sufficient to perform adequately on the SODT-R, as some authors such as Hunt, Pellegrino, Frick, Farr, and Alderton (1988), or Schmidt and Hunter (1998) have defended, but, additionally, intermediate values in SATO are required, allowing us to identify the individuals who do not present extremely impulsive performances (where speed would be preferred to accuracy) or extremely cautious performances (where accuracy would be preferred to speed).

Summing up, obtained results indicate that:

1. The relation between RL and deviation is curvilinear, differentiating the four groups of performances: (a) fast-accurate, (b) slow-inaccurate; (c) impulsive, and (d) reflexive. The first two solve the task as a function of a competence variable and the latter two as a function of a personality variable.
2. The differences in the *Z*i scores on the SODT-R do not reflect differences in a genuine cognitive style, but rather differences in SATO.
3. This SATO is different depending on the participants' intelligence level and sex. Both in men and women mean speed decreased as the intelligence score increased. However, neither the amount of the decrease nor the intelligence percentile at which the decrease began is similar among men and women.
4. In the groups of persons with higher intelligence scores, individuals can be found who place more emphasis on speed, the same as individuals who place more emphasis on accuracy can be found in the groups with lower intelligence scores. This indicates that speed does not reflect a deficit of general cognitive resources (operationalized as the intelligence score), but instead it indicates that the influence of impulsivity on performance results in incomplete coding, in terms of assessment and processing of the stimulus.

From our viewpoint, the present work encourages an analysis of the relations between the variables of style and personality, aptitudes, and competences, and, finally, task-solving strategies. Clarification of these relations requires a theoretical analysis of the interaction among these three types of variables.

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Received October, 19, 2006
Revision received January, 25, 2007
Accepted February, 6, 2007