

Multi-criteria Identification of Gifted Children in a Spanish Sample

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The objective of this study was to carry out a multi-criterion identification of gifted subjects in a representative sample of 530 ten-year-old school children. Using the cognitive maturity criterion, 8.4 % of subjects were detected; using the creativity criterion, 12 % of subjects were detected; using the cognitive maturity and creative criteria, 1.1 % of subjects were detected and using the cognitive maturity, creativity and motivation criteria, 2.8 % of subjects were detected. The prevalence of gifted children detected in this study confirms those described by other researchers. The results obtained support the use of flexible detection criteria, based on different theoretical focus, in order to design a wide range of educational interventions adapted to the diversity of high cognitive abilities.

Key words: Multi-criteria identification of gifted children, high capacity children, education and giftedness.

Identificación multi-criterio de sujetos de altas capacidades en una muestra española. El objetivo de este trabajo fue llevar a cabo una identificación multi criterio de sujetos de altas capacidades en una muestra representativa de 530 escolares de 10 años de edad. Según el criterio de madurez cognitiva se detectó un 8.4 % de sujetos; usando el criterio de creatividad se detectaron un 12 % de sujetos; utilizando el criterio de madurez cognitiva y creatividad se detectó un 1.1 % de sujetos y utilizando el criterio madurez cognitiva, creatividad y motivación se detectó un 2.8 % de sujetos. Los datos de prevalencia hallados en este estudio confirman los obtenidos por otros investigadores en otras poblaciones. Los resultados apoyan la utilidad de usar diferentes criterios de identificación con el objetivo de diseñar intervenciones educativas específicas adaptadas a la heterogeneidad de las altas capacidades.

Palabras clave: Identificación multi-criterio, niños superdotados, altas capacidades, educación y superdotación.

Gifted subjects are those who stand out from among their peers in three important components: *intelligence*, *motivation* with regard to the task and *creativity* (Freeman, 1990; Genovard & Castelló, 1990; Gonzalez-Gómez & Gotzens, 1995; Jiménez, 1993; Renzulli 2004, Torrance 1986). *Giftedness* and *talent* are the two categories into which exceptional intellectual capacity can be divided; with the former being mainly defined by its *general nature* and the latter by its *specificity* (Feldhusen & Kroll, 1991). *Talent* is characterized by its *specificity*, i.e. high ability in specific areas, while *giftedness* is characterized by its *generality*, i.e. high ability in a number of different areas simultaneously (Genovard & Castelló, 1990).

Castelló's approach (1996, 1998) is based on the original distinction made by Gagné (1995). This distinction clearly establishes the difference between talent and giftedness: a subject may be academically talented yet not have the IQ of a gifted person; and inversely, a subject may have the IQ of a gifted person yet not be academically talented. This distinction is clearly relevant both to educational practice and to procedures designed to identify gifted subjects (Gagné, 2007).

Providing subjects achieve a good level in all intellectual resources, good ability is assumed in any area, thus justifying general ability (Genovard & Castelló, 1990; Gagné, 1995). This constitutes a *multifactorial representation of intelligence* that does not necessarily have to be located within the framework of any specific theory (Castelló, 1994; Meili, 1985). The definition of *giftedness* in this study coincides with the *Renzulli Model* (1978, 2004), including the extensions of said model developed by the author himself (Renzulli, 1986), inspired by Mönks' critiques (1986, 1994). This definition is supported by authors such as Castelló (1994), Jiménez (1993), Freeman (1990) and Torrance (1986). An individual is considered gifted if he or she demonstrates high *intelligence*, high *motivation* and high *creativity*. According to García-Alcañiz & Izquierdo (1995), what is important about this model is its operating capacity.

Authors generally coincide in not viewing *giftedness* as a homogenous state, but rather a combination of different related aptitudes, which enable the gifted individual to achieve exceptional productivity (Sternberg & Davidson, 2005). In this sense, Apraiz (1996) proposes, that these subjects be referred to as *high capacity individuals*, given that their abilities and aptitudes constitute the basic element of the concept, and the term allows for widely different manifestations of personal characteristics and possibilities. This group will therefore be referred to using the term that allows for the different manifestations of this phenomenon; the total group will be referred to as *high capacity individuals*, with specific nuances being added in accordance with the different manifestations of said capacities. Thus, the term *giftedness* will, in accordance with Renzulli (1978), be used to refer to those who possess a combination of superior cognitive skills, creativity and motivation. The term *giftedness* will also be used in accordance with the definition offered by Castelló (1996), to refer to those subjects who

achieve a high level in all the intellectual aptitudes assessed. Nevertheless, and in accordance also with the definition offered by Castelló (1996), we will talk about subjects both with *simple talents (verbal and non verbal)* and *creative talents* (Renzulli, 1991; Torrance, 1977), when said individuals stand out with regard to one of these aptitudes.

Epidemiological research establishes the prevalence rate of high capacity children in schools as between 3% and 5% (Benito, 2003; Castelló, 1998; Prieto, 1997; Renzulli, 1978; Sternberg and Davidson, 2005; Tourón, Peralta and Reparas, 1998). This rate varies in accordance with the procedure used (inclusive or exclusive). Benito (2003) states that in 1991, the prevalence rate of children in Spain with an IQ of over 130 was 2.2% of the population; a proportion of 1 child out of every 25. More inclusively, Renzulli (1986) offers an initial identification figure of up to 10% of the population of school-age children. The objective of this study is to identify high capacity children from the 10-year-old population in the province of Bizkaia (Spain), using different criteria.

In the study, four different identification models will be formulated and empirically specified. The use of different criteria lays the groundwork for the design of educational programs that adapt to this diversity. The use of diverse criteria is consistent with current thinking regarding the study of intelligence, which sees intelligence as diverse and related to other factors such as emotional and motivational ones (Fernández-Berrocal & Extremera, 2006).

METHOD

Participants

A representative sample of the population of 10-year-old children in Bizkaia (Spain) was selected. A stratified random sampling process was then carried out with four categories being established: school year, gender, language model and type of school. Subjects were selected in complete classes within the established age range. The total number of 10-year-old children in the province was 8.878. 530 families participated in the study, a figure equivalent in representative terms to a confidence level of 95.5% and an error margin of 6%.

The sampling process was prolonged until the collaboration of 530 subjects (an adequate number for ensuring a representative sample) had been achieved. It was important to ensure a large sample group because the main objective of the study was to analyze the heterogeneity of those subjects classified as gifted.

Instruments

Renzulli scale for identifying high capacity children (Renzulli, Hartment & Callahan, 1971; Renzulli, Hartment & Callahan, 2001). *Behavioral characteristics:*

assessed by the children themselves regarding their likes and dislikes, hobbies and interests.

Differential and General Aptitude Battery, BADyG. (Yuste, 1995): *General Cognitive Maturity. General Verbal Maturity: General Non Verbal Maturity.* The decision to administer the BADyG test was based on the possible presence of cultural bias derived from the use of the WISC, as highlighted by Fakolade (2006). Furthermore, the BADyG enabled us to assess capacity without measuring verbal factors, as described by Lohman (2005). A similar strategy to that described in this study has recently been used by Pierce *et al.* (2007).

Torrance Test of Creative Thinking. Figural Form (TTCT) (Cramon, 1998; Torrance, 1974). *Creativity: divergent thinking and characteristic and ongoing processing of information. Divided into different processes: Fluency, Originality, Elaboration, Abstractness of titles and Resistance to premature closure.*

Renzulli Classification of Characteristics Scale for Teachers (Renzulli, Hartment & Callahan, 1971; Renzulli, Hartment & Callahan, 2001). *Learning characteristics, Leadership characteristics, Communication characteristics, Planning characteristics, Creativity characteristics and Motivation.*

Each of the instruments was translated and adapted to the Basque language in accordance with the guidelines established by the International Test Commission (Hambleton, 1994), following points 7, 8 and 9 included in the 22 guidelines established by said commission. The synthesis published by Isasi, Balluerka and Gorostiaga (2000) was applied to the BADyG. It is important to note that the Renzulli and TCT scales do not have scaled versions for the Spanish population, and were therefore simply translated.

The tests were translated by specialists with a mastery of both languages, who were also psychologists with a basic knowledge of psychometrics. The sample used for the adaptation process comprised 220 subjects, 100 from state schools and 120 from private ones. Of these, 110 completed the test in Spanish and the other 110 in Basque.

Finally, a total of 174 questionnaires were processed, since the remaining 46 were incorrectly completed. In order to establish equivalence criteria between both versions of the test, a *direct adaptation design* and an *inverse adaptation design* were ruled out as definitive tests due to possible subjective bias, and a statistical design and procedure were used instead.

A check was carried out to ensure that the sample groups (both adapted and original version) were distributed normally on the basis of the Kolmogorov-Smirnov test. The result of the *t* test was not significant, thus confirming the equivalence of the two sample groups. Finally, we should point out that the means comparison does not guarantee the parallel nature of the original and adapted versions, as pointed out by Balluerka, Gorostiaga, Alonso-Arbiol and Aramburu (2007) and Muñiz and Hambleton

(2000). The adapted version of the BADyG test was subjected to a reliability analysis when applied to the study sample.

Procedure

The participation of families was 82%. The assessment was carried out as follows: Day one: Assessment of all subjects using *Renzulli Scales for students*, completed by the subjects themselves (15 minutes). Days two, three and four: *BADyG*. Day five: *TTCT (Torrance Test, Figural Form A)*.

Teachers were given four questionnaires of the *Renzulli Scale for teachers*, to be completed on the last day of the assessment. Of the four questionnaires provided, three carried the name and surnames of those students who had scored highest in the *Renzulli Scale for students*, in accordance with the criteria of the scale itself. The fourth questionnaire asked teachers to select from among all participants those which best fit the characteristics described by said scale.

RESULTS

Descriptive statistics and instrument reliability

Renzulli scale Behavioral characteristics: $\alpha = .84$ / original scale $\alpha = .89$. ($X = 66.48$, $SD = 9.072$). *BADyG General Cognitive Maturity*: $\alpha = .99$ / original scale $\alpha = .98$ ($X = 96.19$, $SD = 29.008$). *BADyG General Verbal Maturity*: $\alpha = .98$ / original scale $\alpha = .95$ ($X = 46.48$, $SD = 15.884$). *BADyG Verbal Mental Ability* ($\alpha = .95$) ($X = 19.81$, $SD = 7.145$). *Verbal Comprehension* ($\alpha = .93$) ($X = 14.45$, $SD = 6.4$). *Numerical Aptitude* ($\alpha = .94$) ($X = 12.14$, $SD = 4.893$). *BADyG General Non Verbal Maturity* ($\alpha = .97$ / original scale $\alpha = .96$) ($X = 50.13$, $SD = 15.675$). *Non Verbal Mental Ability* ($\alpha = .95$) ($X = 19.81$, $SD = 7.145$). *Logical Reasoning* ($\alpha = .95$) ($X = 16.33$, $SD = 6.302$). *Spatial Aptitude* ($\alpha = .74$) ($X = 11.93$, $SD = 4.791$). *TCT Creativity: Fluency* ($MD = 21.68$, $SD = 6.857$). *Originality* ($X = 10.28$, $SD = 3.960$). *Elaboration* ($X = 6.05$, $SD = 3.843$). *Abstractness of titles* ($X = 5.94$, $SD = 4.875$). *Resistance to premature closure* ($X = 1.95$, $SD = 1.610$) ($\alpha = .80$ / original scale $\alpha = .83$). *Renzulli Classification of Characteristics Scale for Teachers: Learning characteristics* ($X = 19.73$, $SD = 6.647$), *Leadership characteristics* ($X = 23.76$, $SD = 8.063$), *Communication characteristics* ($X = 21.49$, $SD = 9.368$), *Planning characteristics* ($X = 33.79$, $SD = 11.432$), *Creativity characteristics* ($X = 22.05$, $SD = 8.131$), *Motivation* ($X = 21.49$, $SD = 6.905$). ($\alpha = .82$ / original scale $\alpha = .87$).

The original reliability refers to the Spanish version of the BADyG, when stated in the test manual (Yuste, 1995) and to the scores obtained by subjects answering the tests in Spanish in the cases of the TCT and the Renzulli scales. The other alpha scores refer to those obtained by subjects answering the tests in Basque.

Criterion 1: Identification based on Aptitudes

Inclusion criteria: The cut-off score for distinguishing between high capacity and non high capacity children was a percentile of over 82 in the Differential and General Aptitude test, in all the factors assessed, reflected in the Cognitive Maturity Index (CMI). This process was broken down into two sub-processes, in accordance with General Verbal Maturity and General Non Verbal Maturity levels, thus identifying those students with percentiles of over 82 in said tests (respectively). The cut-off score of over the 82nd percentile is justified by the fact that in all the original BADyG scales, this score is equivalent to an Intelligence Quotient (IQ) of 115, which guarantees that subjects can be clearly classified as having a higher intellectual capacity, since they are at least 5 points over the limit for normal intellectual ability (established as between 90 and 110).

The 28 subjects with exclusive verbal talent were not included in the 45 gifted subjects; nor were the 45 gifted subjects included in the 77 subjects with exclusive non verbal talent.

Criterion 2: Identification based on Creativity

Inclusion criteria: all of the subjects identified obtained scores over and above the 75th percentile in all the factors measured. The subjects included in this criterion would not have been included in the verbal and non verbal talent groups, since the aim of the criterion was to identify exclusively creative subjects, and the only overlap permitted was with gifted subjects, as shown in criterion 3.

Criterion 3: Identification based on Aptitudes and Creativity

Inclusion criteria: The merging of the first and second criteria when considering exclusively those subjects who scored over the 82nd percentile in the Cognitive Maturity Index and demonstrated creativity levels which, according to Torrance, obtained scores over and above the 75th percentile in all the factors measured.

Criterion 4: Identification based on Renzulli's Model

Inclusion criteria: Once the Renzulli Scale had been applied, the teachers selected four children from each classroom with the highest scores in their peer group. Of these four subjects per class, three were the ones who had obtained the highest score in their class on the Renzulli scale completed by the subjects themselves, and the other was selected by the teacher; all four were assessed by each teacher using the Renzulli scale for teachers; from the 24 selected classes then, 96 subjects were pre-identified. Of these 96, a selection was made of those who showed high/very high General Cognitive Maturity (BADyG), a high level of Motivation (those scoring over 21.49) and a high level of Creativity (those scoring over 22.05, the mean). In this case, both *Motivation* and *Creativity* were the result of the assessment carried out using the Renzulli Scales for

teachers. It should be remembered that the creativity assessed by the Renzulli Scale for Teachers is social and academic, while the Torrance Test evaluates only graphic creativity.

Table 1 shows the name of each group and the frequencies obtained in the identification process.

Table 1. Summary of the results of the identification

Criterion	Tool	Concept	Result	%
1 INDEX OF COGNITIVE MATURITY (over 82)	BADyG	GIFTED	45 Subjects	8.4% of the sample
Index of general verbal maturity	BADyG	Specific TALENT	28 Subjects	5.3% of the sample
Index of general non verbal maturity	BADyG	Specific TALENT	77 Subjects	14.4% of the sample
2 LEVEL OF CREATIVITY	TTCT (Torrance)	CREATIVE TALENT	64 Subjects	12% of the sample
3 LEVEL OF CREATIVITY AND COGNITIVE MATURITY LEVEL	TTCT (Torrance) and BADyG	GIFTED	6 Subjects	1.1% of the sample
4 RENZULLI MODEL: Intelligence, Creativity and Motivation	Renzulli scales for students Renzulli scales for teachers BADyG	HIGH ABILITY	Pre-selection: 96 Subjects Final selection: 15 Subjects	2.8% of the sample and 15.8% of the pre-identified subjects

Overlap and associations between criteria:

Criterion 1: within the criterion itself it is obvious that there is no overlap between gifted and verbally and non verbally talented subjects, since giftedness involves possessing both talents simultaneously. Neither of the two types of talent overlap at all with criteria 3 or 4, since they are not giftedness. Talented subjects do not overlapped with the subjects from criterion 2 because merely being included in criterion 2 means that the subjects failed to comply with any of the inclusion requisites for talent criteria. 15 of the subjects in criterion 1 overlapped with criterion 4 since, in order to be included in criterion 4, subjects must necessarily have met the requisites of criterion 1.

Criterion 2: no overlap was detected here with the talented subjects from criterion 1, although there was an overlap of 6 subjects with the gifted subjects from criterion 1, precisely because these 6 subjects constituted criterion 3, which required giftedness combined with high creativity indexes in the Torrance Test. Criterion 3: the 6 subjects from criterion 3 overlapped with criterion 1 (high CMI / giftedness) and criterion 2 (Torrance creativity). These 6 subjects were not the same as the 15 subjects with a high CMI included in criterion 4. Criterion 4: the 15 subjects included in this criterion overlapped with the 45 included in criterion 1. With the exception of the obvious relationship between criteria 1 and 4 (all subjects in criterion 4 are also included in criterion 1), and criterion 1 and 3 (all subjects in criterion 3 are also included in

criterion 1) and 2 and 3 (6 subjects), no significant correlations were found between the criteria, thus confirming the intention to ensure exclusivity.

DISCUSSION

This work approaches identification as the process of determining which subjects demonstrate specific abilities and/or outstanding skills which require special attention in the classroom, as highlighted by authors such as Logan *et al.* (1997), López, Bralic & Arancibia (2002) and Sternberg & Reiss (2004). The identification process focuses on the characteristics established by Renzulli (1978, 2004) in his Three Ring Model (Criterion 4, identification), and on the aspects of generality and specificity identified by Castelló (1994) in relation to giftedness and talent, respectively (identification Criterion 1 and Criterion 2). Other possibilities for identification, which combine other cognitive aspects (identification Criterion 3, Williams, 2001) were not ruled out. The identification strategy based on four identification criteria provides a certain degree of flexibility with which to approach the whole process, given the lack of consensus between different authors regarding the definition of this construct (Blough, Rittenhouse & Dancer, 1999; Tourón *et al.*, 1998; Sarouphim, 1999; Williams, 2001).

Following the first identification criterion and according to the results obtained (8.4% of the sample), the definitions offered by different authors (Jackson & Butterfield, 1990; Sternberg, 1993, 1997; Tridico, 2001), which defend identification based only on the subject's intellectual capacity, were indeed found to be useful and compatible with other criteria of *giftedness*. The second criterion consisted of the identification of children with *creative talent* (Gagné, 1995; Olszewski-Kubilius, 2002; Sternberg, 2007), as a concept different from giftedness and not as understood by other authors (Gardner, 1995; Mönks, 1994), who use the terms *intelligence* and talent indiscriminately. The result of the third criterion supports the proposal of those who consider that together with high cognitive capacity, creativity or production focused on excellence to be a key dimension of giftedness (Sternberg, 1993; Williams, 2001).

Identification based on the fourth criterion was carried out by applying a theoretical model in which the inclusive criterion of the model itself meant that identification was based on the confluence of both a high cognitive level, a high creative level and a high level of commitment to the task (Okagaki & Sternberg, 1993; Chan, 2000; Henry, Sternberg & Grigorenko, 2005). This model had been extended by Manzano y Arranz (2008) and Van Boxtel, Roelofs & Sanders (1986), who added the importance of social and family factors for the development of giftedness. Other authors have also included in their definitions variables such as self-concept (Feldhusen & Kroll, 1991) and luck (Tannenbaum, 1993; Gagné, 1995), as well as leadership and physical capacity (Marland, 1972).

The data obtained in this study do not support the indistinct use of the terms *giftedness* and *talent* (Gardner, 1995; Mönks, 1994), but rather support the model which distinguishes giftedness from talent (Gagné, 1995). Castelló (1996) is one of the authors who distinguishes between the two terms, using *giftedness* to refer to subjects with good aptitudes in all intellectual resources, and *talented* to refer to those who stand out in just one or several aptitudes. The prevalence of subjects who stand out only in specific aptitudes such as general verbal maturity (5.3%), general non verbal maturity (14.4%) and creativity (12%) clearly supports the distinction between gifted subjects and talented subjects.

The use of exclusive identification criteria in this study contributes further evidence in favor of the independent nature of high cognitive capacities and creative talent, since some subjects were found to be highly creative according to the Torrance Test (1974) yet not at all talented or gifted; the independent nature of creative thought and cognitive capacity has already been described in other studies (Vincente, Decker and Mumford, 2002). The coexistence of gifted and talented subjects supports modular theories regarding the structure of intelligence, defended by Karmiloff – Smith (1992), as well as the theory of multiple types of intelligence defended by Sternberg (1997). Similarly, the inclusion of motivational aspects in Renzulli's proposal (1986) evokes current ideas regarding emotional intelligence (Fernández–Berrocal & Extremera, 2006; Zhang & Sternberg, 2006).

The results indicate that frequency rates in the sample differ in accordance with the criterion used; this finding coincides with existing scientific literature, given that the majority of definitions do not specify the incidence of giftedness and talent in the population, and even when they do so, they generally employ either inclusive (Renzulli, 1986 and Williams, 2001) or restrictive (Mönks, 1994 and Tridico, 2001) criteria, indiscriminately. Different authors often use screening methods in the identification process, rendering them more inclusive, selecting between 10% and 15% (Chan 2000; Sarouphim, 1999 and Weston, 2001), as evident in this study, in the results obtained using the first, second and third criteria. Despite this however, there are also a number of more restrictive processes (Blough *et al.*, 1999 and Tridico, 2001), which are reflected in the results obtained from the use of the third criterion. In general, the most recent studies in Spain indicate a prevalence of gifted persons of between 3% and 5% of the general population (Tourón *et al.*, 1998, Tourón, 2001, 2005). Nevertheless, we should point out the differences observed in the results in accordance with the criterion used for identification. The results obtained using Criteria 1 and 2 identify 8.4% and 12.6% respectively, thus coinciding with the results found in other studies, such as the one conducted by Rodríguez (1998), which, out of a total sample group of 3.819 six-grade students, identified 22.5% as talented and 7% as gifted. Said percentages may perhaps be considered fairly low when compared to the results of other, more inclusive

procedures. The use of a multi-criteria strategy is equally endorsed by a recent study by Gagné (2007).

Results of this study are of great use for significantly corroborating the hypothesis that there is a percentage of high capacity children which have not, until now, been identified and which account for around 3% of the total population, if calculated according to the model proposed by Renzulli (1978, 2004) and for more than 5% (8.4%) if calculated according to the generality criteria proposed by Castelló (1996). Each of the criteria used point to the existence of groups of people with outstanding characteristics which need to be detected in order for appropriate educational intervention programs to be set up. As Luz Pérez states (2007), early identification of high capacities is especially important in the case of women, since many of them lose their potential as a result of not being properly identified and stimulated to foster their intellectual development.

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