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POWER OF GENETICS: ADAPTATION AND VALIDATION OF A SCALE FOR MEASURING BELIEF IN GENETIC DETERMINISM (BGD) WITH CLASSICAL TEST ANALYSIS AND RASCH ANALYSIS

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This study presents the adaptation and validation of a scale for measuring the Belief in Genetic Determinism (BGD; Keller, 2005). BGD can be intended as the extent to which people believe that human beings and their behaviors are driven by the influence of genes. A translated BGD 18-item scale was administered to 448 Italian students from several Departments. Data were analyzed by means of both Classical Testing procedures (CT) and Rasch Analysis (RA). Results revealed a mono-factorial structure of the scale. CT allowed us to retain all items of the scale whereas RA imposed to remove four items. Both versions of the scale were analyzed for convergent and discriminant validity. Expectations were confirmed for both versions of the BGD scale. Results are discussed.

Key words: Genetic determinism; Essentialist beliefs; Rasch analysis; Questionnaire validation.

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"(…) non ut sit satis aestimare, parens melior homini an tristior noverca fuerit."
(Pliny the Elder, *Naturalis Historia*, Book VII)

INTRODUCTION

Recent research on stereotyping and prejudice has emphasized the role of essentialist beliefs, that is, laypeople's beliefs about the essence and entitativity of the social categories (Haslam, Rothschild, & Ernst, 2000, 2002; Keller, 2005; Yzerbyt, Judd, & Corneille, 2004). The first author that introduced the concept of psychological essentialism was Medin (1989) who stated that people's representations of things are based on the assumption that they have an essence, or nature, which makes them what they are. More recently, Yzerbyt and colleagues (e.g. Yzerbyt et al., 2004; Yzerbyt, Rocher, & Schadron, 1997) extended Medin's speculation to psychological research on stereotyping and prejudice, stating that stereotypes "comprise more than the list of attributes that help to describe a particular social category. They also, and perhaps most importantly, include the underlying explanation that links these attributes together" (Yzerbyt et al., 1997, p. 21). Accordingly, several authors have emphasized the role that essentialist beliefs and stereotypes play in rationalizing the existing social order (Hoffman & Hurst, 1990) and their function in serving system justification motives (Jost & Banaji, 1994; Yzerbyt et al., 1997).

Generally speaking, essentialist beliefs can pertain to several aspects of social categories such as, for example, uniformity, exclusivity, immutability, and so on. Analyzing the structure of essentialist beliefs, Haslam et al. (2000, 2002) asked participants to rate several aspects related to essentialist features of social categories. Results showed a two-dimension solution. The first dimension comprised aspects depicting social categories as "natural kinds." The second dimension represented the degree to which categories were seen as "entitative kinds." Accordingly, Social Dominance Theory (Sidanius & Pratto, 1999) pays great attention to socially shared legitimizing myths, that is, the beliefs that enhance or attenuate hierarchies and differences among social groups. Sidanius (1993), for example, refers to the so-called "sacred myths" implying that the hegemony of one group over other groups is a direct consequence of divine will. This kind of justification has been often employed in the past centuries in order to legitimate and defend noble heritage and, together, the right of royal families to exercize and maintain their power.

Today, divine and religious motives have lost their legitimizing power so that it is very rare to hear someone asserting that a group is better than another for divine motives. From the XIX century until now, several alternative explanations have been advanced in order to explain group differences. Among them, there certainly is a genetic justification. This kind of explanation has been so strong that even social scientists resorted to it in order to account for (and often legitimate) social differences. An example, near us, is Mario Canella's racial psychology (see Volpato, 2000), even though, perhaps, the most famous psychological case of genetic explanation of differences among groups is Arthur Jensen's impressive work about racial inequality in IQ. In his article, published in the *Harvard Educational Review* in 1969, Jensen (a white researcher) vehemently claimed that Blacks were genetically inferior to Whites in intelligence (see also Rushton & Jensen, 2005). This explanation was adduced as evidence that any effort to improve the educational levels of disadvantaged social classes would reach no result (see Whimbey & Whimbey, 1976).

The examples cited above refer to the "psychological" discourse but also influenced political decisions and public opinion. Haslam et al.'s (2000, 2002) results clearly evidence that lay people's essentialism is composed of distinct dimensions, among which, most interestingly, there is a biological component in categories as "natural kinds" (see also Keller, 2005). The biological component, that is, the belief that a social category and its members share some fundamental and immutable characteristics fixed in the genes, represents an aspect of special interest for social scientists. Indeed, genetic justification has often been used in order to explain extreme forms of exploitation (such as slavery; Spencer, 2006) or even genocide (Keller, 2005).

Nevertheless, attention toward consequences of genetic determinism belief is still rather sparse. An exception is represented by Keller's (2005) work. Keller developed a belief in genetic determination (BGD) scale: a measure of the biological component of essentialism. Three studies revealed a basic monodimensional structure of the BGD scale as well as its good reliability and validity; they also showed that the genetic essentialist belief is related to stereotyping and prejudice. According to Keller (2005), the BGD scale is not conceived as a bipolar measure (that is, high values of BGD must logically imply low values of other beliefs about the nature of human beings). Rather, essentialism is composed of several dimensions which can be highly correlated (see Haslam, Rothschild, & Ernst, 2004). Accordingly, previous findings showed that the biological component is only one distinct dimension of the essentialist beliefs (see Haslam et al., 2000, 2002).

The primary aim of the present study is to develop and analyze an Italian version of the BGD scale employing both Classical Test Analysis and Rasch Analysis. Since BGD was never tested with the Rasch approach, analyzing the scale using this approach seems to be useful for a clearer understanding of its psychometric properties.

METHOD

Sample and Procedure

Participants were 448 students from several Departments at the University of Parma. Two- hundred (44.6%) were men. The mean age was 22 (*SD* = 5.32). The majority attended Psychology (32.6%), followed by Engineering (12.7%), and Humanities (11.9%).

Questionnaires were administered in two ways: a) paper-and-pencil (30%) and b) on-line questionnaire (70%).[1] Participants completed the BGD scale; the Social Dominance Orientation (SDO; Pratto, Sidanius, Stallworth, & Malle 1994); the Portrait Values Questionnaire (PVQ; Caricati, 2007; Schwartz et al., 2001) (reduced version); the Social Desirability Scale (Manganelli, Canova, & Marcorin, 2000), and a personal information section, in this order. In the paper-and-pencil version, respondents were informed that participation was voluntary and no reward would be given. None of them refused to participate.

Measures

BGD. The belief in genetic determinism was assessed with 18 items (see Table 1) translated and adapted from the original scale (Keller, 2005). Three independent researchers translated the items from English to Italian. The three versions were then compared and any disagreement among translators was resolved by discussion. The final scale was then back-translated by an English expert in order to assure compatibility. In the final version of the scale, all items were statements concerning the belief on genetic causes of some behaviors and characteristics. Four items were reverse scored. Participants had to indicate their level of agreement with each statement on a 9-point Likert-type scale anchored by *strongly disagree* and *strongly agree*.

SDO. The Italian (Aiello, Leone, Chirumbolo, & Pratto, 2005) 16-item SDO scale (Pratto et al., 1994) was used. The scale is composed of 16 items with a 7-point Likert-type scale. As evidenced by Jost and Thompson (2000), SDO is composed of two factors. The first, named Group-Based Dominance (GBD), measures people's tendency to accept and support group-based social dominance; the latter, named Opposition to Equality (OEQ), refers to people's tendency to oppose to social equality. Reliability was good for both GBD (Cronbach's α = .74) and OEQ (α = .88).

PVQ. Value orientation was assessed by using Schwartz's Portrait Value Questionnaire (PVQ; Schwartz et al., 2001). PVQ measures 10 social values according to Schwartz's model (Schwartz, 1992). The values are Benevolence, Universalism, Hedonism, Self-direction, Stimula-

TABLE 1
Items and statistical properties of both BGD18 and BGD14

	BGD18			BGD14		
	L	*M*	*SD*	INFIT MNSQ	OUTFIT MNSQ	Logit
1. I think the chief reason why parents and children are so alike in behavior and character is that they possess a shared genetic inheritance	.638	4.00	1.97	0.76	0.77	0.12
2. In my opinion, alcoholism is caused primarily by genetic factors	.480	2.43	1.67	0.95	0.93	1.23
3. I think that differences between men and women in behavior and personality are largely determined by genetic predisposition	.516	5.02	2.11	1.01	1.03	–0.50
4. I believe that children inherit many of their personal traits from their parents	.450	5.60	2.06	1.05	1.09	–0.79
6. I am convinced that very few behavioral traits of humans can be traced back to their genes (r)	.598	4.72	2.31	1.08	1.09	–0.29
7. I believe that many talents that individuals possess can be attributed to genetic causes	.546	5.02	2.11	0.94	0.97	–0.47
9. I believe that many differences between humans of different skin color can be attributed to differences in genetic predispositions	.497	3.58	2.13	1.08	1.12	0.36
10. I think that genetic predispositions have little influence on a person's personality characteristics (r)	.682	4.74	2.45	1.05	1.03	–0.28
11. In my view, many forms of human behavior are biologically determined and can therefore be seen as instinctual	.419	4.98	2.06	1.01	1.03	–0.48
12. The fate of each person lies in his or her genes	.523	2.70	1.80	1.01	1.04	1.01
13. I am of the opinion that intelligence is a trait that is strongly determined by genetic predispositions	.601	4.61	2.13	0.89	0.88	–0.25
14. I believe that genetic predispositions have no influence whatsoever on the development of intellectual abilities (r)	.514	5.93	2.38	1.30	1.26	–1.02
16. I think the genetic differences between Asians and Europeans are an important cause for the differences in abilities between individuals from these groups	.562	3.40	1.89	0.88	0.88	0.47
18. I believe that an analysis of my genetic predispositions will allow a trained scientist to predict many of my abilities and traits without having any personal knowledge of me	.634	2.88	1.88	0.96	1.00	0.88
5. In my view, the development of homosexuality in a person can be attributed to genetic causes	.362	3.42	2.42	1.00	1.00	*
8. I think that the upbringing by parents and the social environment have far greater significance for the development of abilities and personal traits than genetic predispositions (r)	.401	2.46	1.69	1.00	1.00	*
17. I think that twins, because of the identical genetic predispositions, will be very similar in their behavior even if they were adopted and raised in different families	.486	3.27	2.13	1.00	1.00	*
15. I am convinced that the analysis of the genetic predispositions of an embryo allows good predictions as to which characteristic and abilities the child will develop	.527	3.08	2.02	1.00	1.00	*

Note. Numbers before items represent the order of presentation in the original scale.
L = loadings on the first factor; *M* = mean; *SD* = standard deviation; (r) = reverse scored; * Items excluded in the BGD14 scale.

tion, Power, Achievement, Conformity, Tradition, and Security. They are arranged along two bipolar higher-order dimensions: Self-Transcendence (Universalism and Benevolence) versus Self-Enhancement (Power and Achievement), Conservation (Security, Conformity, and Tradition) versus Openness to Change (Stimulation and Self-direction). Opposite values have opposite motivational emphases while adjacent values share motivational emphasis. Hedonism shares features of both Self-Enhancement and Openness to Change. Each item portrays a person in terms of her/his desires and aspiration; for each item, respondents have to indicate how much the portrayed person is similar to themselves on a 6-point scale (*very much like me*, *like me*, *somewhat like me*, *a little like me*, *not like me*, *not like me at all*). In this study, a reduced version of the PVQ composed of 21 items was used. Preliminary Smallest Space Analysis (SSA; Guttman, 1968) showed that the PVQ reduced version was able to identify the 10 values. The score for each value was then calculated averaging the respective items; factor analysis (PCA with oblimin rotation) was applied to these scores. Consistently with Schwartz's model, results revealed a four-factor structure: Self-Transcendence, Self-Enhancement, Openness to change, and Conservation. The higher-order scores were calculated as the means of the values composing them (e.q., the higher order dimension of Self-Transcendence was computed as the mean of Universalism and Benevolence, see Schwartz, 1992).

Social Desirability. Social desirability was measured with a short version of Crowne and Marlowe's (1960) Social Desirability Bias Scale proposed by Manganelli et al. (2000). The scale was composed of 12 items; a 6-point Likert scale was used (α = .70).

Personal information. Finally, participants indicated their gender, nationality, age, place of birth, occupation, and Department they were attending. Moreover, political orientation (with five categories: right, center-right, center, center-left, left) and religiosity (with three categories: believer, non-practicing believer, non-believer) were assessed.

ANALYSES

Both Classical Test Analysis and Rasch Analysis were performed on the data. This was done in order to reach a better understanding of the BDG scale. The use of the classical test analysis was justified by the need to test the monodimensional structure of the scale and to compare the present findings with those of Keller's (2005) original work (based on exploratory factor analysis).

Classical Test Analysis

The aim of this analysis was to check the monofactorial structure of the scale. Indeed, in Keller's work (2005), the BGD scale presented a basic monodimensional structure across three studies. A scale can be considered roughly uni-dimensional when the first eigenvalue is relatively larger than the others (Hambleton & Traub, 1973; Lord, 1980). Moreover, all the items were required to load on the first factor (in this case, a factor loading equal or greater than .30 was chosen; Kline, 1992). In addition, the items with an item-total correlation lower than .30 were eliminated.

Rasch Analysis

We chose to analyze the scale by means of Rasch analysis for two reasons. First, as stated above, BGD was never analyzed with this procedure. Second, Rasch analysis allowed us to compare items and people independently, that is, person scores are not dependent on the set of items, and item difficulty is not related to the sample used, allowing us to reach a better generalizability of the scale.

Rasch analysis for polytomous items will not be described in detail here, but the reader can find excellent explanations of the method also in papers written for this journal (Giampaglia & Roccato, 2002; Passini, 2003). However, some specifications about the approach used in this work are needed. First of all, the approach employed is that proposed by Linacre and Wright (see Linacre, 2002, 2004; Linacre & Wright, 1998; Wright & Master, 1982), and Winsteps 5.1.26 for Windows was applied (Linacre, 2006). Like in all Rasch models, the scale is required to be monodimensional and thresholds are monotonically ordered. However, the approach used pays little attention to the χ^2 overall fit indexes and single item overall χ^2.

Instead, a very important statistic is fit Mean Squared (MNSQ; simply computed as χ^2/df), which determines the contribution of each item in defining the measured construct. A value equal to 1 is ideal, but values ranging between 0.60 and 1.40 can be considered satisfactory when Likert scales are used (Bond & Fox, 2001). High MNSQ values indicate a lack of homogeneity with the other items whereas low values indicate redundancy (Linacre & Wright, 1998). The statistics linked to MNSQ are two: INFIT and OUTFIT. INFIT is an inlier sensitive fit statistic based on χ^2; it is more sensitive to unexpected patterns of observations by persons on items that are roughly adequate (that is, neither too easy nor too hard) for them (and vice-versa). OUTFIT, instead, is an outlier sensitive fit measure based on the conventional χ^2 statistic. It is more sensitive to unexpected observations by persons on items that are relatively very easy or very hard for them (and vice-versa). Since INFIT is influenced by response patterns, it represents a greater threat for measurement. For both INFIT and OUTFIT significance (probability), the χ^2 (mean-square) occurring by chance is computed (Z-standardized, ZSTD). ZSTDs are unit-normal deviates, where .05 significance corresponds to $t = 1.96$. Usually, ZSTD should not be higher than ±2; however, if mean-squares are acceptable, then ZSTD can be ignored (Linacre, 2006).

Another index taken into account is the Root Mean Squared Error (RMSE), which represents an estimation of the scale mean error. When a perfect fit is present, RMSE is equal to 0.

Further, the reliability was checked with an indicator called Index Separation Reliability (ISR; Wright & Masters, 1982). ISR is computed for items (Item Separation Reliability) and for persons (Person Separation Reliability) separately, so that it is possible to find high reliability among items and low reliability among persons. This is quite different from reliabilities, such as Cronbach's α, which are computed using both item and personal information. Accordingly, in Classical Test Analysis there is no analogous to Item Separation Reliability. Nevertheless, both person and item reliability indexes are interpreted in the same way as Cronbach's α with values near 1 indicating high reliability. For Item Separation Reliability, values greater than .80 are generally considered acceptable (Fox & Jones, 1998).

Finally, in this work the Rating Scale Model (RSM; Andrich, 1978, 1982) was used. This model assumes that thresholds among response categories are the same across all items.

RESULTS

Factor Analysis

A principal component factor analysis (without rotation) was performed. Results revealed five factors with eigenvalue greater than 1, and accounting for 56% of the total variance. As expected, the first factor had an eigenvalue (5.08, 28% of the total variance) relatively larger than the second (1.58, 8%) and the third (1.26; 7%) factor. The scree test (Cattell, 1966) supported the hypothesis of one main factor. Moreover, all items had loadings greater than .30 (M = .54) on this factor (Table 1) and all had an item-total correlation greater than .30 (M = .44). Consistently with Keller's (2005) results, Cronbach's α was good (.85) and did not increase if any item was deleted.

Thus, these first analyses confirmed the monofactorial structure of the scale. This was also supported by the confirmatory factor analysis which revealed that the one-factor solution had satisfactory fit indexes [$\chi^2(89) = 172.80$, $p < .001$; $\chi^2/df = 1.94$; CFI = .96; RMSEA = .046; CI = .036 – .056; NFI = .92; NNFI = .92; IFI = .96].

Rasch Analysis

Thresholds Order

The first analysis revealed that the thresholds were not correctly ordered (for response categories from 1 to 9: –.45, –.56, –.17, –.49, .25, .08, .67, .63). Thresholds failing to increase monotonically indicate a low probability to observe certain response categories ("step disordering"; Linacre, 2002). This means that, in the present case, the nine response categories were not monotonically ordered with respect to the likelihood to which they were chosen. Thus, we tried to collapse response categories in order to reach a monotonic threshold order. Two solutions with five response categories turned out to be acceptable. The first solution aggregated categories as 122333445 and the second as 122334455. In the first solution, thresholds were correctly ordered (for response categories from 1 to 5: –1.74, –.89, .80, 1.82) as well as in the second one (from 1 to 5: –1.50, –.32, 41, 1.45). However, in the first solution four items had no ordered thresholds (item 15, 17, 5, and 16), whereas in the second solution there were only three not-ordered items (item 8, 15, 17). Since the two solutions were identical for what concerns other indexes, the second was chosen in order to retain as many ordered items as possible (the values in solution 1 and 2, respectively, were: item separation reliability = .99 and .99, person separation reliability = .81 and .82, RMSE = .06 and .06, Cronbach's α KR-20 = .83 and 84).

Dimensionality

The analysis without items 8, 15, and 17 revealed that item 5 had INFIT and OUTFIT indexes greater than 1.40 (1.59 and 1.56, respectively). The item was then deleted and another analysis was performed. All items (right side of Table 1) had INFIT and OUTFIT ranging be-

tween .60 and 1.40 (INFIT, $M = 1.00$, $SD = 0.12$; ZSTD = –0.10; OUTFIT, $M = 1.01$, $SD = 0.12$; ZSTD = 0.10) Moreover, item separation reliability was excellent (.99) as well as the person separation reliability (.85; Cronbach's α KR-20 = .83). Item RMSE was very satisfactory (.05). The mean for item-total point-biserial correlations was .46. These results clearly indicate that the 14-item solution had a satisfactory uni-dimensional structure.

Is the Scale Adequate to the Sample?

Rasch analysis allows us to measure both person and item parameter on the same metric unit. This means that person and item scores are directly comparable. Figure 1 shows the distribution of persons and items on the measured construct. As one can see, the mean for the persons ($M = –0.20$) is very close to the mean for the items (conventionally = 0). This means that the scale is able to adequately capture people's belief in genetic determinism. Indeed, as shown in Figure 1, only 42 participants (9%) had GBD levels so low and 5 participants (1%) had GBD levels so high to be undetectable by the scale. The Test Information Function (Bond & Fox, 2001) confirmed the adequacy of the scale for the sample discrimination.

Admittedly, the scale can be said to be basically adequate to the sample.

Correlating Scores from Factor and Rasch Analysis

Both classical and Rasch scales showed good psychometric characteristics. Thus, both scales will be analyzed in the following sections. This will be done for two main reasons. First, since both scales satisfied the psychometric requirements, there are no strong reasons to choose one scale over the other. Second, given that the two versions of the scale are slightly different (in Rasch analysis, four items were excluded), verifying if these differences can affect the properties of the scale seems interesting and useful. We have then computed two scores for the BGD. The first one, called BGD18, was computed, according to classical analysis, as the mean of the 18 items composing the original scale. The second, called BGD14, was computed as the Logit scores of the 14 items composing the Rasch-analyzed scale. Both scores (i.e., BGD18 and BGD14) were standardized in order to allow comparison.

Convergent Validity and Discriminant Validity Analyses

Correlational expectations. On the basis of previous research and theoretical speculations, the following correlational findings were expected:

— BGD14 and 18 should be positively correlated with GBD (which refers to the support of dominance among groups) but not with OEQ (which instead refers to opposition to economic equality).

— BGD14 and 18 should be positively correlated with Self-Enhancement, Openness to Change, and Conservation. Moreover, the scales should not be correlated with Self-Transcendence.

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More  BGD                  +   More "difficult" items
oriented  participants     +

   3                       +
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                        .  |
                       .#  |   BGD2
                        .  |
   1                  ###  +   BGD12
                       .#  |   BGD18
                    .####  |S
                      .##  S|
                 .######   |   BGD16   BGD9
                 .######   |
       .############       |   BGD1
   0           .######    +M
        .########### M|
           .#########     |   BGD10r  BGD13   BGD6r
       .############       |   BGD11   BGD3    BGD7
                 .####    |
              .#######     |S
                 .####     |   BGD4
  –1                 ##  S+   BGD14r
                     ##    |
                   .###    |
                    .##    |
                      #    |
                      .    |
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  –2                  .    +
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                           |
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  –3                       +
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                      .    |
                           |
                           |
  –4                       +

Less  BGD                  +   Easier  items
oriented  participants     +
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Note. Each "#" represents four participants, each "." represents one participants; *M* = mean, *S* = standard deviation.

FIGURE 1

BGD14 with 5 categories of response: Conjoint distribution of items and participants

As it can be seen in Table 2, BGD14 and BGD18 had the same pattern of correlations. More precisely, as expected, both scales were positively correlated with GBD but not with OEQ. Moreover, they were positively correlated with the values of Conservation, Self-Enhancement, and Openness to Change but not with the value of Self-Transcendence. Furthermore, consistently with Keller's (2005) findings, BGD was not significantly correlated with Social desirability. The lack of correlation between BGD and OEQ, Self-Transcendence, and Social desirability is in favor of the discriminant validity of the scales.

TABLE 2
Correlations between BGD18, BGD14, and other variables

	1	2	3	4	5	6	7	8	9
1. BGD14 (logit)	1								
2. BGD18	.95**	1							
3. GBD	.29**	.26**	1						
4. OEQ	.09	.07	.48**	1					
5. Self-Transcendence	–.09	–.08	–.39**	–.51**	1				
6. Self-Enhancement	.14**	.13**	.40**	.34**	–.24**	1			
7. Openness to Change	.10*	.11*	.13**	.12*	.05	.35**	1		
8. Conservation	.14**	.12*	.18**	.10*	.17**	.08	–.02	1	
9. Social Desirability	–.09	–.08	–.24**	–.13**	.34**	–.26**	–.01	.12*	1
M	–0.20	3.99	3.44	2.75	4.74	3.47	4.12	3.91	3.65
SD	0.79	1.08	1.05	1.27	0.86	1.07	0.83	0.82	0.68

* $p < .05$, ** $p < .01$.

Mean Differences

In order to assess the capability of the two scales to discriminate among different people, gender, political orientations, and religiosity were taken into account. For each of these independent variables, two analyses of variance were performed where BGD14 and BGD18 were considered as dependent variables (with unstandardized scores). The main expectations follow. Since Keller (2005) found that men are higher in BDG than women and Yzerbyt et al. (1997) assume that dominant groups are more likely to embrace an essentialistic worldview, we expected men would be higher in BGD than women. Since essentialist beliefs can be considered as part of the conservative belief system (Keller, 2005), political orientation should affect people's tendency toward BGD. Allen (1994), for example, discussed the core of political conservatism focusing on biological determinism. Thus, right-wing people are expected to be higher in BGD than left-wing people. For what concerns religiosity, non-practicing believers are expected to be higher in BGD than others. This should occur because Protestant ethic (Weber, 1930\2001) is very close to the core of conservative ideology (Jost, Glaser, Kruglanski, & Sulloway, 2003) and it is arguable that Catholic non-practicing believers embody the protestant ethic to a great extent. Indeed, they are less involved in religious practices but, rather, they emphasize the necessity of constant labor as a sign of personal salvation and grace (Patterson, 2004; Weber, 1930/2001). On

the contrary, Catholic practicing believers should emphasize passive obedience to authority, fatalism, and collectivist values (Jones, 1997; Weber, 1930/2001). The result of this reasoning is that non-practicing believers, more than practicing believers, should be oriented to powerfully individualistic beliefs. Indeed, as Jones (1997) argued "economic individualism had its roots in religious individualism" (p. 775). Accordingly, a contrast where non-practicing believers (2) were opposed to believers and non-believers (both coded as –1) was planned.

ANOVA results revealed that, contrary to expectations, gender did not affect either BGD14 or BGD18 scores (both *F*s < 1) (Table 3).

Political orientation, instead, affected BGD14, $F(4, 423) = 2.97$, $p < .05$, $\eta_p^2 = .03$ as well as BGD18, $F(4, 423) = 2.43$, $p < .05$, $\eta_p^2 = .02$. As expected, Tukey's post hoc test revealed that right-wing oriented people tended to be higher in BGD (Table 3).

For religiosity, ANOVAs revealed a significant effect for BGD14, $F(2, 438) = 3.01$, $p = .05$, $\eta_p^2 = .01$, but only a marginally significant effect for BGD18, $F(2, 438) = 2.66$, $p = .07$, $\eta_p^2 = .01$. However, the planned contrast was significant for both BGD14, $t(438) = 2.25$, $p < .05$, $\eta_p^2 = .01$), and BGD18, $t(438) = 2.23$, $p < .05$, $\eta_p^2 = .01$. More precisely, as expected, non-practicing believers were higher than the two other groups on both BGD14 and BGD18.

TABLE 3
One-Way Anova on both BGD18 and BGD14, considering the effects of gender, political, and religious orientation

		BGD18		BGD14	
	N	*M*	*SD*	*M*	*SD*
Men	200	3.99_a	1.05	-0.20_a	0.77
Women	248	3.98_a	1.11	-0.20_a	0.81
Right	57	4.14_a	1.19	-0.01_a	0.87
Center-Right	60	4.15_a	1.08	-0.07_a	0.75
Center	46	4.14_a	1.08	-0.12_a	0.79
Center-Left	156	4.00_b	1.10	-0.22_b	0.80
Left	109	3.72_b	1.02	-0.39_b	0.76
Non-practicing believers	193	4.12_a	0.99	-0.10_a	0.65
Believers	105	3.87_b	1.01	-0.24_b	0.73
Non-believers	143	3.88_b	1.26	-0.32_b	1.00

Note. For each independent variable, different letters indicate a significant difference between the means (*p*s < .05).

CONCLUSIONS

This study shows good psychometric qualities of both forms of the BGD scale. Both Classical and Rasch Analyses clearly demonstrated a monofactorial structure and revealed a satisfactory reliability as well as good convergent and discriminant validity. Indeed, as expected, both BGD scales were significantly correlated with values of Self-Enhancement, Openness to Change and Conservation, and with Group Based Dominance. Moreover, the fact that, congruently with expectations, BGD scales were not correlated with social desirability, Self-Transcendence

and, more importantly, with Opposition to Equality shows the discriminant validity of the scales. Moreover, present results showed that both scales were able to distinguish between different categories of people: right-wing persons and non-practicing believers were higher in BGD. This seems congruent with previous data showing that one of the dimensions of essentialism is the belief in the power of the genes in shaping human beings (Haslam et al., 2000, 2002, 2004).

Moreover, it seems that the original and Rasch-analyzed scales are comparable. Indeed, for both scales, results replicate Keller's (2005) findings. Even though low size effects suggest some caution in the interpretation of these results, political orientation and religiosity analyses hint that the belief in genetic determinism could be considered as a component of political conservatism (Jost el al., 2003) and right-wing ideology (see e.g., Allen, 1994; Bobbio, 1996). Only gender-related hypothesis was not confirmed. It is worthwhile remembering that Keller discussed gender differences as an indirect test of status difference hypotheses (Yzerbyt et al., 1997). However, gender is a weak operationalization of status differences that may be affected by several other variables. If status hypothesis is not taken into account, there are no (or few) reasons to think that men and women should differ in the extent to which they believe in genetic determinism. This seems to suggest that, when gender comparison is not activated, genetic determinism is a shared belief among dominant and dominated groups and that both groups can employ it in order to justify or bolster the existing social arrangement.

Consistently, convergent and discriminant analyses showed that BGD is associated with more conservative beliefs such as right-wing ideology, Conservation, Self-Enhancement, and Group-Based Dominance, indicating, according to previous data (Haslam et al., 2000, 2002; Jost et al., 2003, Keller, 2005; Yzerbyt et al., 1997), that essentialist beliefs can be considered as beliefs serving conservative and system justification motives. The lack of correlation between BGD and OEQ is more interesting and new. This, however, is quite normal if one thinks that OEQ refers to economical equality rather than social dominance, and seems to indicate that genetic determinism could be used in order to justify vertical relations among groups (e.g., powerful vs. powerless groups), but not in order to justify unequal treatments for groups. This is congruent with data showing that the essentialist perception of women, for example, increases the support for Affirmative Action policies favoring women climbing up the professional ladder (Lorenzi-Cioldi & Buschini, 2005, in press). On one hand, these new data demonstrate the discriminant validity of the BGD scale and, on the other, they support Jost and Thompson's (2000) claim that SDO is composed of two distinct, albeit related, components.

The whole set of these results seems to confirm previous data showing that essentialist beliefs are associated with basic social-cognitive motives and political conservatism. Moreover, present findings seem to confirm Keller's (2005) suggestion that ideological motives build the basis for the formation of essentialist beliefs.

Finally, a question arises: what scale should be used? BGD18 or BGD14? At this stage, a clear answer to this question does not exist or, rather, the answer is that both scales could be used. What is advisable is the use of BGD14 with small samples and BGD18 with larger samples in order to better cover the range of people's measured trait. Rasch analysis, however, revealed that the best solution is achieved through items with five (rather than nine) categories of response. Suggesting the use of a Likert scale with only five points seems therefore legitimate.

In conclusion, the present results show good psychometric qualities for the BGD scale and support its use in research on group relations, prejudice, and stereotyping. Indeed, results

showed that the scale fulfils requirements of both classical and Rasch Analysis. However, even though very supportive of the BGD scale, the present results do not take into account the relation between BGD and discrimination directly. Thus, further research is needed in order to better understand the connection between BGD and some forms of prejudice and stereotyping.

NOTE

1. No differences were found between results from the two procedures.

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