
The Dynamic Identity Fusion Index: A New Continuous Measure of Identity Fusion for Web-Based Questionnaires

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Abstract

We introduce a computer-based measure of “identity fusion,” a form of group alignment characterized by a visceral feeling of oneness with a group. Past measures of identity fusion (a single pictorial item and a 7-item verbal scale) have demonstrated a unique capacity to predict willingness to engage in extreme pro-group behaviors (e.g., fighting and dying for one’s group). The Dynamic Identity Fusion Index (DIFI) combines the simplicity of the single pictorial item with the higher fidelity afforded by a continuous scale. The DIFI runs on a script written in JavaScript and works on both traditional computers and modern touch-pad devices. It allows for simultaneous assessment of self-group *distance* and *overlap*, two conceptually distinct components of group alignment. Study 1 assessed the criterion validity of the two components of the DIFI and discovered that the overlap metric was a better indicator of identity fusion than the distance metric. Four more studies demonstrated DIFI’s temporal stability (Study 2), convergent and discriminant validity (Study 3), and predictive validity, specifically endorsement of pro-group behaviors (Study 4). We discuss implications of the DIFI for future research on identity fusion and recommend when it should be used.

Keywords

identity fusion, visual analog scale, computer-based measure

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Researchers from several disciplines have faced the challenge of explaining why some people do extraordinary things for their groups. From soldiers who risk life and limb to save their brothers in arms in battle, to philanthropists who donate their personal fortunes to charities or research foundations, some individuals more than others are especially motivated to go beyond the call of duty for a group. Swann, Jetten, Gómez, Whitehouse, and Bastian (2012) proposed a common mechanism—identity fusion—that underlies each of these extreme sacrifices for the group.

Identity fusion is a visceral feeling of “oneness” with the group that involves the interconnection of the personal self (viz., idiosyncratic features of the individual) and a social self (viz., features the individual shares with the group). This feeling is associated with increased permeability of the borders between the personal and the social self. This blurred barrier, in turn, increases the likelihood that the fused person’s group identity will influence his or her personal identity and vice versa. Within this conceptualization, perceived psychological overlapping between the self and the group could be understood as an analogy of the identity fusion process.

Swann et al. (2012) differentiate identity fusion from previous psychological constructs related to group membership, such as social identification. Social identity perspectives (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987) emphasize that (a) social interactions are located on an interpersonal-intergroup continuum such that increases in the activation of social identity diminish the activation of personal identity and vice versa (functional antagonism principle), (b) salient group members perceive themselves as interchangeable with other group members (depersonalization hypothesis), and (c) changes in the context produce temporal changes in levels of identification (salience hypothesis). In contrast, identity fusion theory (Swann, Jetten, Gómez, Whitehouse, & Bastian, 2012) proposes that for highly fused persons (a) their social and personal self can be simultaneously active, combining synergistically to motivate pro-group behavior (identity synergy principle), (b) the combination of membership-based attraction and uniqueness-based attraction may produce exceptionally strong relational ties with fellow group members (relational ties principle), (c) their feelings of personal agency enact pro-group behavior (agentic-personal-self principle), and (d) their pro-group actions provide further support of their high levels of fusion, resulting in high temporal stability of fusion levels (irrevocability principle).

Identity fusion implies high social identification, but it is a unique construct that emphasizes synergistic, self-other influence processes. Exploratory and confirmatory factor analyses revealed that items capturing identity fusion load on a different factor than items capturing group identification (Gómez, Brooks, et al., 2011). Furthermore, dozens of investigations have demonstrated the capacity of measures of identity fusion to predict pro-in-group behaviors while controlling for effects of identification. For example, strongly fused persons are especially willing to (a) endorse fighting and dying for their group (Gómez, Brooks, et al., 2011; Gómez, Morales, Hart, Vázquez, & Swann, 2011; Swann, Gómez, Seyle, Morales, & Huici, 2009), (b) endorse self-sacrifice to save the lives of members of their country in intergroup variations of the trolley dilemma (Gómez, Brooks, et al., 2011; Swann, Gómez, Dovidio, Hart, & Jetten, 2010; Swann et al., 2014), (c) donate to fellow Spaniards in need of financial help (Swann, Gómez, Huici, Morales, & Hixon, 2010) and (d) deny the group’s wrongdoing (Besta, Gómez, & Vázquez, 2014).

Identity fusion is also distinguished from other concepts related to pro-in-group behavior (e.g., high affective commitment, right-wing authoritarianism, and brainwashing). Affective commitment is defined as the extent to which persons feel emotionally involved with their group (Ellemers, Kortekaas, & Ouwerkerk, 1999), regardless of the causes for that involvement. Relative to low fused persons, high fused persons have greater affective commitment to the in-group, but identity fusion predicts pro-in-group behavior more strongly than commitment (Swann, Gómez, Huici, et al., 2010, Preliminary Study 2). Therefore, identity fusion implies affective commitment, but it cannot be reduced to an increased involvement with the group.

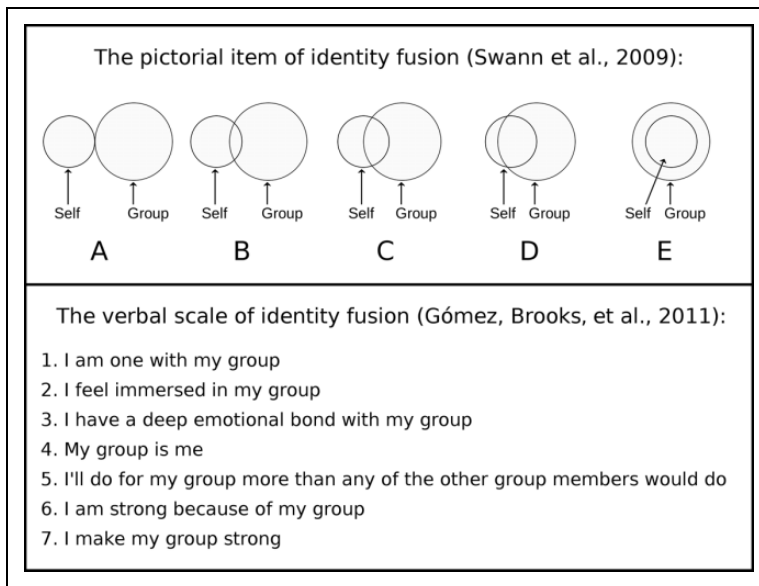


Figure 1. Pictorial item (Swann et al., 2009, top panel) and verbal scale (Gómez, Brooks, et al., 2011, bottom panel) of identity fusion.

Fusion is also distinct from right-wing authoritarianism, which is characterized by a high degree of submission to the authorities, aggressions toward deviants, and a high degree of conventional adherence to the traditions and social norms (Altemeyer, 1981). In contrast to high authoritarians, high fused persons retain a strong sense of personal agency as opposed to submission within the in-group. High fused persons endorse acts such as fighting and dying for the group that diverge from the group prototype (i.e., going “above and beyond the call of duty,” Codol, 1975) and think of themselves as individual actors with personal agendas that they put at the service of the interests of the group. For example, Swann et al. (2012) argued that fused leaders may remain highly committed to the group while exercising their individual agency to steer the group in new directions. Similarly, identity fusion is different from brainwashing because high fused persons may not conform to the leaders. Insofar as the group leader encourages behaviors that harm the group, fused persons will challenge the group leader to protect the group and its members.

To date, two measures of identity fusion have been developed and validated to capture the feelings and consequences of being fused with a group, that is, a single pictorial item¹ (Swann et al., 2009, see top panel of Figure 1) and a 7-item verbal scale (Gómez, Brooks, et al., 2011; see bottom panel of Figure 1).

Both measures have faithfully predicted outcome measures in previous studies. Nevertheless, each has a downside. The fact that the pictorial measure is only a single-item makes it quick to administer, but it lacks the predictive fidelity of the verbal scale. Conversely, the high fidelity of the verbal scale is offset by the fact that it is time consuming. In this report, we introduce the Dynamic Identity Fusion Index (DIFI), which is designed to combine the simplicity of the single pictorial item with the higher predictive fidelity of the verbal scale.

Development of the DIFI

The DIFI was adapted from a previous pictorial measure of identity fusion (Swann et al., 2009). In designing the new measure, we modeled ours after the Continuous Including Others in the Self scale

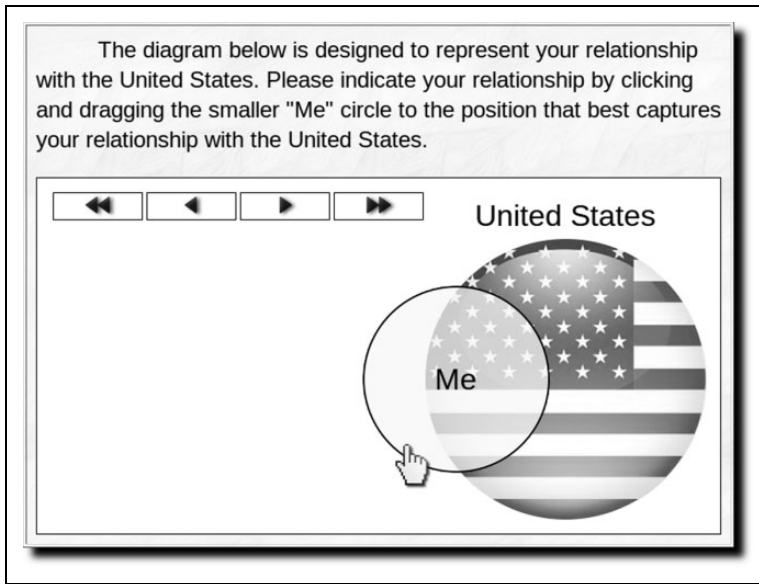


Figure 2. Example of the Dynamic Identity Fusion Index (DIFI).

(Continuous IOS; Le, Moss, & Mashek, 2007), a dynamic measure of relationship closeness designed to be embedded within web-based questionnaires. Their measure allows assessing both distance and overlap between two circles of equal size in a diagram. Furthermore, the authors created a website about the Continuous IOS, including the code, documentation, and examples (Le & Moss, 2007).

The visual design of the DIFI was adapted from the original pictorial item of identity fusion (see Figure 2). The DIFI shows a figure formed by two circles of different sizes in the screen of the computer. The small circle represents “the self” and it is initially positioned in the left quadrant of the screen. The big circle represents “the group” and is fixed in the right margin of the screen. The size ratio between both circles is 2:3 equivalent to the size ratio in the original pictorial item.

The respondent can move the small circle by either clicking and dragging with the mouse, or pressing the control buttons situated at the top of the screen. When the two circles overlap, the blending of colors enhances the visual analogy of identity fusion. This design also allows for larger images, making it possible to visualize the measure with high quality regardless of the screen resolution of each device.

We programmed the DIFI script for use on web-based questionnaires. The measure runs in JavaScript on traditional computers as well as modern touch-pad devices. The DIFI script and instructions can be found at <http://www.uned.es/fusion/DIFI/> (Jiménez, 2014). Using the script, researchers are able to customize the presentation of the scale (labels, colors, starting position, etc.). The DIFI also allows respondents to indicate levels of fusion with several different groups on the same webpage; in the future this feature could be used to encourage the conscious comparison of fusion with various target groups (e.g., in-group and out-group).

Output Data of the DIFI: Distance and Overlap

The dynamic characteristic of the DIFI allows collecting responses in two independent fields, namely *distance* (the separation between the centers of the small and the big circles) and *overlap* (the degree to which the areas of the big and the small circle intersect). Distance output is measured

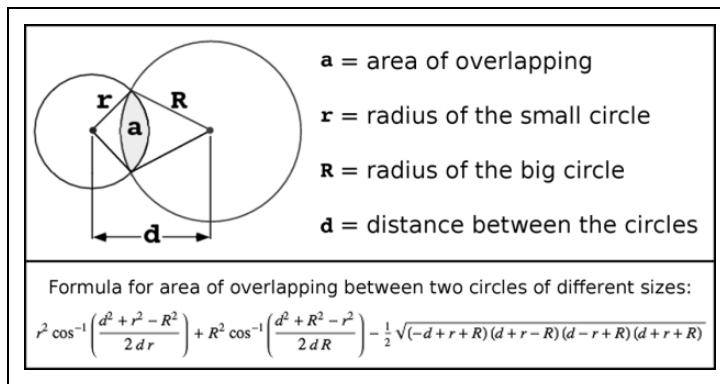


Figure 3. Area of overlapping between two circles of different sizes.

directly from the numbers of pixels that separate the edges of both circles. This output is equal to zero at the exact point where the borders contact, it has a negative value when the small circle moves away from the big circle, and a positive value when the two circles are overlapping. The possible values for distance range from -100 (away) to 125 (close), with values above 100 corresponding to positions wherein the small circle is completely enveloped by the big one (total overlapping), and the value 125 corresponds to the position in which the small circle is in the center of the big one.

Overlap output is indirectly calculated as the percentage of small circle area that lies within the big circle. This output is a percentage ranging from 0 to 100 , representing the degree to which the small circle overlaps the big circle. Overlap is equal to 0 when the small circle is outside of the big circle, it has values between 1 and 99 when both circles are partially overlapping, and it is equal to 100 when the small circle is totally inside the big one (regardless of the distance between both circles).

When the circles are partially overlapping, distance and overlap outputs have a nonlinear mathematical relationship. Overlap output is calculated using the mathematical formula for the area of overlapping between two circles of different sizes (a), which is based on the distance between the center of both circles (d), the radius of the small circle (r), and the radius of the big one (R ; see Figure 3). Finally, to calculate the percentage of overlap, the area of overlap between the circles (a) is divided by the area of the small circle ($\text{Pi} \cdot r^2$) and multiplied by 100 : overlap output = $(100 \cdot a) / (\text{Pi} \cdot r^2)$.

Java Versus JavaScript Languages

Le, Moss, and Mashek (2007) employed a Java applet to create their scale, and additional JavaScript code to interface the applet with a web page. If technologies other than HTML are used in an online investigation, it could encourage dropout and distort the sample (Stieger, Göritz, & Voracek, 2011). In particular, embedding Java applets on web-based questionnaires must be used with special caution because it often requires the installation of additional software. However, using exclusively JavaScript allows any person to run the measure directly on his or her device without having to install or update any software.

JavaScript is a standard, scripting language that permits dynamic behavior on websites. Most popular browsers can interpret JavaScript code embedded in webpages, and unlike Java, JavaScript is usually active by default. To prove the advantage of using JavaScript versus Java, we designed a clone version of the Continuous IOS by Le et al. (2007) programmed only in JavaScript: http://www.uned.es/fusion/Continuous_IOS/ (Jiménez & Alonso-Gutiérrez, 2014). Then, we tested the new JavaScript version of the Continuous IOS using a sample of 102 university students. All participants

were able to complete the measure using various browsers and operating systems without any technical issues. Consequently, to design the DIFI we used only JavaScript code. Finally, the DIFI script was tested in the most popular web browsers (Internet Explorer, Mozilla Firefox, Google Chrome, Opera, Safari, etc.) and computer devices (PCs, tablets, mobiles, etc.). Full information, including the DIFI script, instructions for using in HTML and Qualtrics, and examples are available on the DIFI website (Jiménez, 2014). Researchers may access the JavaScript code of the DIFI at the following address: <http://www.uned.es/fusion/DIFI/code.htm>.

Overview of the Studies

The DIFI represents our efforts to develop a novel, easily modifiable, flexibly administered, construct-valid measure of identity fusion that combines key elements of two past measures of fusion (Gómez, Brooks, et al., 2011; Swann et al., 2009) with new, theoretically informed characteristics.

Study 1 examined the criterion validity of the DIFI and tested which of the outputs recorded by the script (self-group distance and overlap) measures identity fusion most faithfully. Study 2 examined temporal stability of the DIFI. We collected responses to the DIFI at Times 1 and 2 (3 months later) with the same participants. Study 3 examined the DIFI's convergent and discriminant validity. We correlated the DIFI with the pictorial item and the verbal scale as well as other scales that we did, or did not, expect to be related to the newly developed DIFI. Finally, Study 4 examined whether the DIFI predicts willingness to endorse pro-group behaviors for the group. In this study, we compared the predictive validity of the DIFI to the predictive validity of the pictorial item (Swann et al., 2009) and the verbal scale (Gómez, Brooks, et al., 2011).

Study 1: Criterion Validity of the DIFI Outputs—Overlap Versus Distance

This study sought to determine which of both indexes produced by the DIFI, overlap and distance, is a more valid operationalization of identity fusion. As criterion measures, we used the two established measures of identity fusion (i.e., the pictorial item and the verbal scale). We predicted that overlap would be more strongly related to identity fusion scores than distance. We based our prediction on Swann, Gómez, Seyle, Morales, and Huici (2009; preliminary Study 4) evidence that when the small “self” circle is inside the big “group” circle, identity fusion is equally predictive whether the small circle is in the center or in the left-hand portion of the big circle.

Method

Participants and Procedure

The participants were 542 Spanish undergraduate volunteers (70% women, $M_{\text{age}} = 33.26$, $SD = 9.76$) enrolled in Universidad Nacional de Educación a Distancia (UNED). All participated online, typically from their homes.

Participants responded to a questionnaire including the three measures of identity fusion with the country in counterbalanced order: the pictorial item (Swann et al., 2009; see Figure 1), the verbal scale (Gómez, Brooks, et al., 2011), consisting of 7 items on 7-point scales ranging from 0 (*strongly disagree*) to 6 (*strongly agree*; e.g., “I am one with my country, I make my country strong”), $\alpha = .85$, and the DIFI. To avoid suspicion, the study was presented as a validation of a new measure, advising that some questions may seem similar. Participants did not question or comment on the redundancy in the measures as a problem during debriefings in any of the studies of this article.

Table 1. Means, SDs and Correlations Between the Outputs of the DIFI (Distance and Overlap) and the Previous Measures of Identity Fusion, Verbal Scale, and Pictorial Item (Considered as Dichotomous or Continuous).

	Mean (SD)	Overlap	Verbal Scale	Pictorial Item (Dichot.)	Pictorial Item (Cont.)
Distance	49.56 (42.02)	.91**	.62**	.64**	.89**
Overlap	45.16 (32.73)		.67**	.65**	.93**
Verbal Scale	2.24 (1.21)			.40**	.64**
Pictorial item (dichot.)	14.2% Totally fused				.68**
Pictorial item (cont.)	3.02 (1.18)				

Note. DIFI = Dynamic Identity Fusion Index; Dichot. = dichotomous; Cont. = continuous.

** $p < .01$.

Results and Discussion

Unlike a previous investigation (Swann et al., 2009), there was no evidence in any of the studies in this article that responses to the pictorial item of identity fusion were bimodal. Nevertheless, to allow for comparison to previous work, we report results considering the pictorial item as dichotomous (i.e., those who indicated the total overlap “E” option were considered “fused,” else “nonfused”) as well as continuous.

For the analyses, we computed a dichotomous score for the pictorial item (see Swann et al., 2009; -1 for nonfused, and 1 for fused) but also centered scores for the pictorial item (treated continuously), the two DIFI outputs, overlap and distance, and the mean of the verbal scale. Means, SDs, and correlations between the measures are depicted in Table 1. Correlations between the DIFI outputs and the previous fusion measures were relatively high, with values ranging from .62 to .93.

To determine how effectively the two DIFI outputs, distance and overlap, were related to the verbal and the pictorial measures of identity fusion, we conducted a series of partial correlations. The partial correlation between verbal scale and overlap controlling for distance was $r(540) = .33$, $p < .001$, and the partial correlation between verbal scale and distance controlling for overlap was $r(540) = .02$, $p = .69$. The partial correlation between pictorial item (as continuous) and overlap controlling for distance was $r(540) = .61$, $p < .001$, and the partial correlation between pictorial item (as continuous) and distance controlling for overlap was $r(540) = .28$, $p < .001$. Correlation tests indicate that the partial correlation between the two earlier measures of fusion, verbal and pictorial, respectively, and overlap are significantly higher than the partial correlations between these two measures of fusion and distance, $z_s > 5.28$, $p_s < .001$.

Results of Study 1 showed that the distance and overlap components of the DIFI were highly correlated with the two existing measures of identity fusion. Importantly, the analyses also indicated that, as expected, overlap was more strongly related to the fusion measures than distance. These results reinforce the theoretical framework of identity fusion (see also preliminary Study 4 of Swann et al., 2009).

Study 2: Temporal Stability of the DIFI

A key principle of identity fusion theory is irrevocability: once an individual becomes strongly fused to the group, he or she will stay strongly fused over time (Swann et al., 2012). To determine if scores on the DIFI would support this principle, we had participants complete the DIFI once and then again after 3 months.

Method

Participants and Procedure

Participants were 70 Spanish undergraduate volunteers (84% women, $M_{\text{age}} = 35.10$, $SD = 9.11$) enrolled in UNED. Participants completed an online questionnaire including the DIFI with 12.9% choosing 100% of overlap. In a second wave, 3 months later, the same participants responded to the same questionnaire, with 8.6% choosing 100% of overlap. In both waves, the DIFI referred to identity fusion with the country.

Results and Discussion

The test–retest correlation over a 3-month period for the DIFI was respectable, $r(68) = .87$, $p < .001$ for overlap, and $r(68) = .75$, $p < .001$ for distance. The observed high temporal stability of both DIFI components is consistent with both theory (Swann et al., 2012) and past evidence showing that the pictorial fusion item displays high temporal stability. Specifically, Gómez, Brooks, et al. (2011; Study 2) found that the test–retest correlation for the pictorial fusion item over a 6-month period was $r(618) = .56$, $p < .001$.

In addition, the test–retest correlation for overlap is significantly higher than this correlation for distance, $z = 2.60$, $p = .004$, and thus suggests that overlap is more stable than distance. Since the findings of both studies (1 and 2) suggest that overlap is a better indicator of identity fusion than distance, we will accordingly use the overlap component of the DIFI as the measure of identity fusion in the remaining studies in this article.²

Study 3: Convergent and Discriminant Validity of the DIFI

Having demonstrated DIFI's criterion validity and temporal stability, we explored the convergent and discriminant validity of our measure. To assess convergent validity, we correlated the DIFI with established identity fusion measures and other theoretically related measure, that is, denial of the country's wrongdoing (Besta et al., 2014).

To assess discriminant validity, we correlated scores on the DIFI with two measures, namely, biological essentialism and the need to evaluate. To test whether the DIFI merely taps a tendency to essentialize people into biological categories (e.g., race, sex), we included a measure of biological essentialism. This measure is defined as the belief that human differences are rooted in biological bases and genetic inheritance (Bastian & Haslam, 2006). Theoretically, individuals with a more biological essentialized view of people should be more sensitive to perceive a genetic relationship with other members of their national group, but this should not have a direct relationship to identity fusion according to previous research. Gómez, Brooks, et al. (2011; Study 4) found a weak relationship between identity fusion with the country and biological essentialism, with values of $r = .13$ for the verbal scale and $r = .05$ for the pictorial item. Therefore, we predicted that the DIFI would correlate modestly with biological essentialism, ruling out the possibility that responses to the DIFI only reflect perceived racial relationship with other members of the own country.

Finally, to test whether the DIFI merely taps a tendency to respond in the extreme, we included a measure of the need to evaluate. Need to evaluate measures the individual differences in the tendency to engage in evaluative thoughts toward a variety of social and political issues (Jarvis & Petty, 1996). Instead, identity fusion is not a personality trait but refers to the feelings of unity with a specific group regardless of the feelings toward other groups (Swann et al., 2009). We predicted that the DIFI would not correlate with the need to evaluate, ruling out the possibility that responses to the DIFI reflect generic response tendencies.

Table 2. Convergent and Discriminant Validity in Study 3.

	Mean (SD)	Verbal Scale	Pictorial Item (Cont.)	Pictorial Item (Dichot.)	Deny Country's Wrongdoing	Biological Essentialism	Need to Evaluate
DIFI	44.68 (36.48)	.65**	.93**	.68**	.34**	.06	.03
Verbal Scale	2.06 (1.26)		.57**	.37**	.39**	.17	-.03
Pictorial Item (cont.)	2.87 (1.34)			.73**	.32**	.11	.02
Pictorial Item (dichot.)	17.1% Totally fused				.20	.02	-.08
Deny country's wrongdoing	.55 (.86)					.05	.07
Biological essentialism	2.75 (1.29)						.18
Need to evaluate	3.22 (.86)						

Note. DIFI = Dynamic Identity Fusion Index; Dichot. = dichotomous; Cont. = continuous.

** $p < .01$.

Method

Participants and Procedure

Participants were 82 Spanish undergraduate volunteers (68.8% women, $M_{age} = 35.47$, $SD = 10.25$) enrolled in UNED. Participants completed an online questionnaire including the three measures of identity fusion with the country in counterbalanced order³: the DIFI (19.5% of participants chose 100% overlap), the verbal scale (Gómez, Brooks, et al., 2011), $\alpha = .85$, and the pictorial item (17.1% of participants chose the fusion option, “E”; see Swann et al., 2009). In addition, the questionnaire included the following scales:

Denial of the country's wrongdoing. Denying that one's country engages in wrongdoing was rated on 3 items ranging from 0 (*strongly disagree*) to 6 (*strongly agree*; e.g., “My country would never do anything wrong”; $\alpha = .89$; Besta et al., 2014).

Biological essentialism. Participants rated their agreement with 4 items from a reduced version of the biological essentialism scale (Bastian & Haslam, 2006) on 7-point scales ranging from 0 (*strongly disagree*) to 6 (*strongly agree*; e.g., “The kind of person someone is can be largely attributed to their genetic inheritance”; $\alpha = .88$).

Need to evaluate. Need to evaluate was rated on 10 items ranging from 0 (*extremely uncharacteristic of me*) to 6 (*extremely characteristic of me*; e.g., “I form opinions about everything”; $\alpha = .74$; Jarvis & Petty, 1996).

Results and Discussion

The results in Table 2 largely supported our predictions. That is, the DIFI strongly correlated with the verbal and the pictorial measures of identity fusion. The DIFI was also related with the denial of the country's wrongdoing. Furthermore, the DIFI was unrelated to biological essentialism and need to evaluate. Therefore, when participants respond to the DIFI, they are not interpreting the measure as the degree of genetic relationship with the members of their country, nor base their answers on a general tendency to respond in the extreme toward any social and political issues.

Having demonstrated the criterion validity, stability, convergent, and discriminant validity of the DIFI, the last study sought to examine its predictive validity and do so in comparison to the two already existing measures of identity fusion, the pictorial item (Swann et al., 2009) and the verbal scale (Gómez, Brooks, et al., 2011). Endorsement of pro-group behaviors has been the most common outcome measure in identity fusion literature. Therefore, along with the fusion measures, on Study 4 we applied the most widely used scale of pro-group behaviors.

Study 4: Does the DIFI Predict Endorsement of Pro-Group Behaviors?

Previous research has consistently demonstrated that the pictorial and verbal fusion measures predict endorsement of personal engagement in extreme pro-group behaviors (Gómez, Brooks, et al., 2011; Swann et al., 2009, 2014; Swann, Gómez, Dovidio, et al., 2010). The goal of this study was twofold (1) to examine whether the DIFI also predicts endorsement of pro-group behaviors and (2) to compare the variance accounted for the DIFI as compared to the previous measures of identity fusion, the pictorial item, and the verbal scale.

Method

Participants and procedure

Participants were 95 Spanish undergraduate volunteers (80% women, $M_{age} = 34.78$, $SD = 9.43$) enrolled in UNED. Participants completed an online questionnaire including the three measures of identity fusion with the country in counterbalanced order: the DIFI (9.5% of participants chose 100% overlap), the verbal scale (Gómez, Brooks, et al., 2011), $\alpha = .87$, and the pictorial item (13.7% of participants chose the fusion option, “E”; see Swann et al., 2009).

For the measure of endorsement of pro-group behaviors, participants rated their agreement with 7 items on 7-point scales ranging from 0 (*strongly disagree*) to 6 (*strongly agree*; e.g., “I’d do anything to protect my country, I would sacrifice my life if it saved another Spaniard’s life”; $\alpha = .75$; see Swann et al., 2009).

Results and Discussion

To determine how effectively each of the three identity fusion measures predicted endorsement of pro-group behaviors, independently or as compared with each other, we ran 11 regressions in which the predictors were the verbal scale, the DIFI (both centered), and the pictorial item. To allow for comparison to previous work, we include pictorial item as dichotomous (−1 for nonfused, and 1 for fused) as well as continuous (with centered scores). The results in Table 3 indicate that when considering separately the main effect of each of the three alternative measures of identity fusion, the verbal scale was the strongest predictor of endorsement of pro-group behaviors, then the DIFI, and then the pictorial item (Models 1-2-3-4). Also, when comparing pairs of measures as simultaneous predictors, the verbal scale was a better predictor of endorsement of pro-group behaviors than the DIFI and the pictorial item (Models 5-6-7). But the DIFI was a better predictor than the pictorial item as continuous (Model 8) and as dichotomous (Model 9). Furthermore, when the three measures were entered together in the regression, the best predictor was the verbal scale (Models 10-11).

As expected, the three alternative measures of identity fusion independently predicted endorsement of pro-group behaviors. When the DIFI was compared with the already existing pictorial and verbal measures of identity fusion, the verbal scale was the best predictor of endorsement of pro-group behaviors but, interestingly, the DIFI was a better predictor than the pictorial item. And finally, when the three measures of identity fusion were regressed together on endorsement of pro-group behaviors, the verbal scale was the only significant predictor.

Table 3. Regressions for Predictors of Endorsement of Pro-Group Behaviors in Study 4.

Model	Predictors	<i>b</i>	<i>t</i>	<i>p</i>	VIF
1	Verbal Scale	.59	7.05	**	1.00
2	DIFI	.41	4.39	**	1.00
3	Pictorial item (cont.)	.36	3.70	**	1.00
4	Pictorial item (dichot.)	.20	2.00	*	1.00
5	Verbal Scale	.62	5.01	**	2.16
	DIFI	-.04	-.32	.75	2.16
6	Verbal Scale	.61	5.58	**	1.69
	Pictorial item (cont.)	-.03	-.29	.77	1.69
7	Verbal Scale	.62	6.64	**	1.23
	Pictorial item (dichot.)	-.06	-.68	.50	1.23
8	DIFI	.33	2.32	*	2.31
	Pictorial item (cont.)	.11	.75	.46	2.31
9	DIFI	.53	4.04	**	1.94
	Pictorial item (dichot.)	-.17	-1.27	.21	1.94
10	Verbal Scale	.62	4.91	**	2.24
	DIFI	-.02	-.14	.89	2.40
	Pictorial item (cont.)	-.03	-.19	.85	3.06
11	Verbal Scale	.61	4.83	**	2.22
	DIFI	.02	.13	.89	3.50
	Pictorial item (dichot.)	-.07	-.61	.54	1.99

Note. *b* = standardized regression coefficient; *t* = Student's *t*-test. DIFI = Dynamic Identity Fusion Index; Dichot. = dichotomous; Cont. = continuous.

p* < .05. *p* < .01.

General Discussion

In the present report, we have introduced and validated a new computer-based measure of “identity fusion,” the DIFI. The new measure combines the simplicity of the single pictorial item with higher predictive fidelity than its predecessor. In Study 1, we have demonstrated that the DIFI is highly reliable and that the overlap metric is a better indicator of identity fusion than the distance metric (see Swann et al., 2009; preliminary Study 4). We have also demonstrated the temporal stability of the DIFI (Study 2), its convergent and discriminant validity (Study 3), and its capacity to predict endorsement of pro-group behaviors (Study 4).

Methodologically, the DIFI runs on a script written in JavaScript, which can be used within web-based questionnaires, either in traditional computers or in touch-pad devices. We found that the DIFI was more reliable and a stronger predictor of pro-group behaviors when compared to the classic pictorial item. Although the DIFI did not predict outcomes as strongly as the verbal scale, the DIFI is a shorter and more intuitive measure of identity fusion. Its use is especially suitable for short questionnaires in which a more extensive measure of identity fusion is not required or even for studies aimed at comparing the level of identity fusion with multiple groups simultaneously in which the use of verbal scale would be monotonous. In addition, the visual nature of the measure makes it useful for children, adults with reading limitations, or speakers of languages for which a verbal measure is unavailable. In comparison to more conventional verbal measures, the DIFI might be especially sensitive to the implicit content that gives rise to fusion effects. If so, then the DIFI might be uniquely predictive of nonconscious emotional responses that have been shown to mediate some fusion effects (Swann et al., 2014). Also, the possibilities for customizing the script make the DIFI an attractive option for measuring identity fusion and offer new possibilities that were not accessible up to date, such as including images representing the self and/or the group (see Figure 2).

The DIFI allows for simultaneous assessment of distance between personal and group identities as well as overlap between them. We found, however, that the DIFI's overlap component better captured the identity fusion construct than the distance component. Nonetheless, the distance component of the DIFI deserves further empirical investigation and could be useful in other settings within the broader framework of intra- and intergroup relationship research. For example, for people fully fused with their group who indicate 100% overlap between circles, the distance component could be related with interpersonal influence within the group, which has an alternative application for the study of leadership and power in organizations. The distance component may also reveal some differences among those who indicate 0% overlap as well. This application may be especially useful for understanding intergroup attitudes toward a rival group, where overlap is likely to be 0% but variability in distance is possible. In this case, the DIFI might be interpreted as a visual analogy of social distance toward other group, therefore the distance component could predict the rejection of the out-group members.

Furthermore, for researchers interested in subgroups and superordinate group relations, the DIFI could be adapted in a number of ways. For instance, the DIFI could be modified to assess the perceived relationship between a subgroup (the small circle) and a higher category in the superordinate level (the big circle), which has possible applications for recent lines on the common in-group identity model (Gaertner & Dovidio, 2012). However, any of these alternative uses of the DIFI would require changes in the instructions and further research to ensure the reliability and validity of the measure within the new context of application.

Overall, the DIFI is not a mere adaptation of a traditional measure for web-based questionnaires, it provides new dynamic capabilities that go beyond paper-and-pencil measures. In making the DIFI easy to use and available across all major browsers and devices, we hope our efforts will spur an increase in empirical investigations across a variety of domains. As more researchers become sophisticated users of online mediated methods, the DIFI holds promise in aiding the development of longitudinal, experimental, and survey research high in ecological validity and impact.

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Notes

1. Several past studies of Spanish participants found that the responses to the pictorial item were distributed bimodally: A significant minority of participants indicated the “E—fused” option on the pictorial item and a majority of participants indicated the other four options (Swann et al., 2009). Because of this bimodality, these studies dichotomized pictorial responses into “fused” versus “nonfused” for analyses. More recent studies using both the pictorial and verbal fusion scale in multiple countries, however, have not found a bimodal pattern. Instead, responses have been normally distributed (e.g., Gómez, Brooks, et al., 2011). Although we did not find evidence of bimodality of responses in the studies reported here, we have

computed and conducted analyses treating pictorial item scores as dichotomous and continuous so that the results can be compared with all past studies using either fusion measure. For more information about the development of the prior pictorial and the verbal measures of identity fusion, see Swann et al. (2009, 2012) and Gómez, Brooks, et al. (2011).

2. As in Studies 1 and 2, in Studies 3 and 4 the overlap component of the DIFI had stronger correlations with outcome measures than the distance component of the DIFI. Thus, we suggest that users of the instrument treat the overlap component of the DIFI as a measure of identity fusion. However, although it is not the focus of this article, the distance component of the DIFI could allow measure of other psychosocial processes, such as the social distance relative to an out-group.
3. In Studies 1, 3, and 4, the questionnaire includes the three measures of identity fusion with the country in counterbalanced order. To detect possible order effects, in Study 3 we recorded and analyzed it. We defined three alternative orders of presentation: DIFI-pictorial-verbal, verbal-DIFI-pictorial, and pictorial-verbal-DIFI. No relevant effects on measures of identity fusion were found. Interestingly, there were no significant differences in scores of the DIFI depending on whether the new measure was before or after the pictorial item, $t(80) = .51$ ($p = .61$).

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