

## Aggressive Responses to Troubled Situations in a Sample of Adolescents: A Three-Mode Approach

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We developed a questionnaire for measuring aggressive behaviors, which was administered to a sample of 318 adolescents. The questionnaire consisted of six situations (three related to unknown people and three related to relatives) and seven possible behaviors (related to physical and verbal aggression and to anger). The corresponding person  $\times$  situation  $\times$  response data were analyzed using a three-mode component analysis. Furthermore, 127 participants also completed standard questionnaires related to aggressive behavior and impulsivity. Results showed the expected two latent dimensions for situations and three latent dimensions for responses were appropriate. In addition we found five latent dimensions for persons. The relationships between these five dimensions and standard questionnaires of aggression and impulsivity are discussed.

*Keywords:* multiway analysis, aggressive behavior, impulsivity, adolescence.

En el presente estudio desarrollamos un cuestionario para evaluar las conductas agresivas que fue administrado a una muestra de 318 adolescentes. El cuestionario estaba formado por seis situaciones (tres relacionadas con desconocidos y tres con familiares) y siete posibles comportamientos (relacionados con agresividad física, verbal o ira). Los datos así obtenidos fueron analizados utilizando análisis de componentes principales de tres vías. 127 participantes además completaron cuestionarios tradicionales relacionados con agresividad e impulsividad. Los resultados mostraron las dos dimensiones esperadas de situación y las tres de respuesta. Finalmente se obtuvieron cinco dimensiones latentes de individuo que fueron relacionadas con los cuestionarios tradicionales de agresividad e impulsividad.

*Palabras clave:* análisis de 3 vías, conducta agresiva, impulsividad, adolescencia.

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The constant increase in problems associated with aggression and violence in contemporary society has led to considerable research to analyze these kinds of behaviors and to develop measurement instruments that can be used to assess and prevent them. As an example of these increase, the last two decades homicide rates have peaked in many industrialized countries (Anderson & Bushman, 2002; Loeber, Lacourse & Homish, 2005). Focusing on the different measurement instruments developed in the psychometric domain, the Buss & Perry (1992) Aggression Questionnaire (AQ) is clearly the most widely used in aggression assessment. A review of the literature about research on aggression using psychometric instruments points out that up to a 90% of them applied the AQ. Furthermore it has been adapted and translated to many languages such as Spanish, Japanese, Portuguese, French, Dutch, German, etc.

The AQ was developed based on the Buss & Durke (1957) Hostility Inventory in response to the lack of consensus between the factorial solutions obtained in several studies using this test, because the items related to each scale were established a priori on the AQ. Buss & Perry (1992) used factor analysis to find four aggression scales: physical aggression (PA) and verbal aggression (VA), which represent the instrumental components of aggression; anger (AN), which represents the emotional or affective component; and hostility (HO), which represents the cognitive component of aggression. This four-factor structure has also been found in other translations of the AQ such as Dutch (Meesters, Muris, Bosma, Schouten & Beuving, 1996), Japanese (Nakano, 2001), and Spanish (Andreu, Peña, & Graña, 2002).

Some authors have pointed out inconsistencies in the four-factor structure proposed by Buss and Perry (1992) obtaining only this kind of structure after removing some items, related in many cases with the hostility scale (Archer, Kilpatrick & Bramwell, 1995; Harris, 1995; Meesters et al, 1996; Williams, Boyd, Cascardi, & Poythress, 1996).

Despite these problems, Vigil-Colet, Lorenzo-Seva, Codorniu-Raga & Morales (2005) used the consensus oblimin method to show that it is possible to find a reduced version of the AQ that gives a four factor solution congruent across different cultures and languages with the factors initially proposed by Buss & Perry (1992). Specifically referring to the Spanish adaptation of the AQ, confirmatory factor analysis has shown that both the full and the reduced version of the AQ fit the four factor structure well and, furthermore, this structure is the same for adults and adolescents (Morales-Vives, Codorniu-Raga & Vigil-Colet, 2005; Santisteban, Alvarado & Recio, 2007).

As in many other psychological assessment methods, the AQ and other instruments developed for measuring aggression do not take into account the situations or

contexts where the behavior of interest takes place. This two mode response model focuses on individual's responses to different items which allows the researcher to obtain different factors using a person  $\times$  response matrix. An alternative to this classical two-mode data (person  $\times$  response) is the three-mode three-way data model (Carroll & Arabie, 1980). In a three-mode three-way data model, three modes are involved (persons, responses, and situations), and the data is usually written in a three-way array. To obtain such data, a situation-response questionnaire is administered to a sample of participants. These kinds of data can be analyzed using three-mode component analysis. A detailed description of this model data analysis can be found in Kiers and van Mechelen (2001), and van Mechelen & Kiers (1999). The aim of the analysis is to summarize all the information in the three-way data set by means of three matrices of components, and by describing the relations between these components. The three matrices of components are Person components, Response components, and Situation components. The matrix that describes the relationship between the three kinds of components is known as the *core* matrix.

Many approaches to the study of individual differences explain them without referring to situations, without taking into account that the stability of behavior across situations is at least questionable (Mischel, 1968). An alternative to this traditional trait models is the study of individual differences in terms of profiles across situations (Mischel & Shoda, 1998). From this viewpoint we think that the study of aggression across situations is an important issue, given that many problems related to aggressive behavior with a high social relevance, such as bullying, violence in the workplace or gender-based violence, are related to specific situations or individuals and may be better explained and assessed using a dynamic model than a trait model.

Furthermore the study of direct forms of aggression, such as PA or VA, is especially interesting in children and adolescents for two reasons. The first one is that while adults seem to prefer more indirect and less socially censured forms of aggression, aggression in children and adolescents is more direct (Björkqvist, 1994). In this sense it seems that social maturation processes imply the development of less observable forms of aggression which replace physical and verbal forms (Forrest, Eatough & Shevlin, 2005). The second reason is that childhood and adolescence in comparison with adulthood are characterized by higher levels of aggression, especially PA (Archer, 2004a; Cosi, Vigil-Colet & Canals, 2009). As we will introduce in the next section, we are going to develop a new questionnaire with the purpose to measure PA, VA and AN across different situations so, it is especially relevant to address it to adolescents because this kind of aggression behaviors are more frequent than in adults.

Another objective of this research is to analyze possible gender differences in the different aggression components found across situations. Different studies have shown that men have higher levels of PA than women, while few of these studies have found slight differences in VA with almost negligible effect sizes (Buss & Perry, 1992; Archer et al., 1995; Williams et al., 1996; Bernstein & Gesn 1997; Condon, Morales-Vives, Ferrando & Vigil-Colet, 2007). Taking this into account we expect that those components which are more related to physical aggression may reflect gender differences, with men having higher scores. However, we do not expect differences regarding components more related to verbal aggression or anger. Taking it into account, our objective is to verify if this well known differences in PA between men and women founded in traditional questionnaires are stable across situations or if they are specific of certain situations.

### *Aggressive Responses to troubled Situations*

#### *Development of Aggressive Responses and Troubled Situations*

In response to the lack of aggression inventories that take situational factors into account, we developed the Aggressive Responses to Troubled Situations (ARTS) inventory. The inventory was related to particular components of aggression, and particular situations. It was designed for a adolescents between 14 and 18 years old. The fact that the questionnaire was addressed to adolescents impacted different aspects of its development. The number of responses and situations had to be low to maintain the participant's attention when answering the questionnaire. The response scales had to be appropriate for younger adolescents' comprehension level; therefore, we decided to use binary scales. In fact, the responder just had to mark the responses that he/she would show in a given situation. During the analyses, the responses that were marked were taken as a YES, and the unmarked were taken as a NO. Annex 1 shows an example of the format used to present each situation to the participants.

The components of aggression that we considered were physically aggressive behavior, verbally aggressive behavior, and the emotional component known as anger. These are three of the four components of aggression defined by Buss and Perry (1992). We have not included the fourth component, hostility (HO), for two reasons. The first one is that it is difficult to find situations that may imply behaviors related to the four components, that is PA, VA, AN and HO. The second reason is that different studies have shown that this component has not a clear theoretical definition, being the items of this scale often more related to resentment and suspicion than to aggression (Harris, 1995; Garcia-León, et al. 2002).

The situations we included in the questionnaire were troubled situations generated by a relative (or relatives), or

by an unknown person. The relatives that we considered in the situations were members of the family that have a position of power over the respondent such as parents, grandparents, etc. It is well known that social rank plays an important role in the expression of aggressive behavior and especially in anger expression, being usually the dominant individual of an interaction more free to express anger and aggression (Karniol & Heiman, 1987; Allan & Gilbert, 2002). This is the main reason for the presence of individuals with or without a power position in the situations presented in the questionnaire.

We decided not to use the closest family members (such as brothers, sisters, or cousins), because not all the responders may have them. In addition, the situations were troubled situations, but not heavily aggressive situations. Indeed, to ask to an adolescent to report about heavy aggressive behaviors generated by close relatives (such as parents) could cause personal conflicts if the adolescent was in fact facing this kind of situations in his/her personal life.

The unknown person was defined as an anonymous person that (a) has no previous relationship with the respondent, and (b) is the same sex as the respondent. We decided to present situations where both parties were of the same sex for reasons of simplicity. It is not the same situation if a girl assaults a boy, than if the same girl assaults another girl. The assaulted person will react differently depending on their gender. We decided that to consider all the combinations between the unknown person and responders would have made the questionnaire much too long (especially if more than one situation per combination was to be included in the questionnaire). Therefore, we decided to reduce it to a single possibility: both the unknown person and the responder were of the same sex. We developed a pool of responses and troubled situations that fit with the definitions explained above. This pool was assessed by external judges: ten professional psychologists specialized in adolescent psychology. They were asked to assess the responses and the situations in different aspects using scales from 0 to 10. The situations were assessed in terms of adequateness to adolescents, credibility of the situation, etc. Responses were assessed in terms of the ability to measure different aspects of the aggressive behavior, clarity, adequateness to adolescents, etc. Finally, we retained the seven responses (two related to verbally aggressive behavior, two related to physically aggressive behavior, and three related to anger) and six situations (three related to known people, and three related to relatives) that were best qualified by the external judges in different aspects. The selected responses and situations were included in a single questionnaire that had two versions: one for girls (in which the unknown people were of the same sex), and another for boys (in which the unknown people were of the same sex). The responses are shown in Table 2, and the situations are shown in Table 3.

It must be said that *binary* person  $\times$  behavior  $\times$  situation data can be analyzed using three (hierarchical organized) typologies of persons, responses, and situations known as INDCLAS (Leenen, Van Mechelen, De Boeck, & Rosenberg, 1999), when the underlying dimensions are not supposed to be continuous. For *continuous* person  $\times$  behavior  $\times$  situation data response formats, a three-component analysis model can be used. In our questionnaire we used binary response formats. As already explained, it was an instrumental decision to simplify the response format. However, we understand that the underlying dimensions are continuous, and the dichotomisation has been artificially imposed. With this in mind we developed the questionnaire to be analysed using the three-mode component analysis. It must be pointed out that the artificial dichotomisation of responses will probably reduce the amount of variance in the data set. As the questionnaire was designed to be administered to adolescents, we preferred to simplify the response format, even if some variance was lost. Finally, in order to establish the convergent validity of the questionnaire we administered two tests. The first was the reduced version of the aggression questionnaire (Vigil-Colet et al. 2005) with the aim of relating the scores of our questionnaire to a classical measure of aggression. The second was the dysfunctional scale of Dickman's impulsivity questionnaire (Dickman, 1990) which has been related previously to the instrumental and emotional components of aggression (Vigil-Colet & Codorniu-Raga, 2004).

## Method

### Participants

The participants were 318 adolescents (54.4% girls) from high schools in Spain. They were between 14 and 18 years old, with mean of 16.2 ( $sd = 1.3$ ). The most common age was 17 years, while the least common was 15 years. Participants were approached during high school visits to university open days or in their own classrooms. They were asked to volunteer to participate in an anonymous research study.

### Materials

The 318 participants completed the seven responses related to the six troubled situations (ARTS inventory) already presented in a previous section.

In addition, 127 participants (54 boys and 73 girls) completed the reduced version of the AQ (Vigil-Colet, et al. 2005). This reduced version consists of 20 items: 6 related to physical aggression, 4 related to verbal aggression, 5 related to anger, and 5 related to hostility. Physical and verbal aggression represents the instrumental components

of aggression; anger is the affective component; and hostility is the cognitive component (Buss & Perry, 1992).

The same participants completed the dysfunctional scale of Dickman's Impulsivity Inventory (DII). We used the Spanish adaptation of Dickman's inventory. An analysis using consensus oblimin rotation showed that the factorial structure of this adaptation is equivalent to both the original version and adaptations in other languages. Its internal consistency is .78 for dysfunctional impulsivity (Chico, Tous, Lorenzo-Seva & Vigil-Colet 2003).

The data was analysed using the program *Tucker3.m*, which runs under MATLAB (MATLAB, 1994), and which is available from Kiers (2009). Also SPSS v.15 was used (SPSS, 2006).

### Procedure

First, participants were asked to fill out the ARTS inventory. They were asked to indicate which of the presented responses would best describe his/her reaction to each situation. They were informed that they could select more than one response to each situation. The participants had to judge the first situation with respect to all responses, next the second situation, etc. Figure 1 shows an example of the format used to present each situation to the participants. After each situation, the possible responses were printed, and the participant answered to each situation using the responses available. The order of the responses was the same for all situations. Next, some of the participants were asked to fill out AQ and Dickman inventories. The questionnaire was anonymous, and respondents had to provide only their gender and date of birth.

### Analyses

A detailed analysis was computed for the three-way data set. In the analysis, we followed the flow-chart described in Kiers and van Mechelen (2001). In this section we detail the analyses and some of the results of these analyses.

#### Three-way ANOVA

We carried out a fixed effects three-way ANOVA on the  $318 \times 7 \times 6$  three-way data table. From the decomposition into sums of squares, the three-way interaction plus error term was the largest contribution of all effects (44,6 % of the variance). So the three-way component analysis is justified with this data set.

#### Pre-processing of data

In order to eliminate unwanted artificial scale range differences, as well as to equalize importance of variables, we normalized the response scales so that the variances of all variables were normalized to unity.

*Number of components*

In a three-way component model, different levels of complexity (i.e. the number of components) can be considered. The question is to identify the level of complexity that yields the most useful description of the data set. The aim is to balance fit and parsimony. In addition, one should also take substantive considerations into account when selecting the complexity of the model: the eventual choice should be made on the basis of ease of substantive interpretation.

To help us with this decision, we computed the numerical convex hull based method proposed by Ceulemans and Kiers (2006): it is a numerical method to select a model that has the best badness-of-fit/sum-of-components balance. We had a previous hypothesis about the number of components that could be expected in the data set related to the responses and the situations. In the responses, we expected three different components: one related to physically aggressive behavior; another related to verbally aggressive behavior; and, finally, a third related to anger. In the situations, we expected two different components: one related to stressful situations with relatives; and another related to stressful situations with unknown people. Thus, we computed the goodness-of-fit values (*f*) for all the solutions that have a maximum of three components in the response mode, a maximum of two components in the situation mode, and a maximum of six components in the person mode. Figure 1 shows the relationship between goodness of fit and complexity in our data for different models. The line in Figure 1 represents the higher boundary of the convex hull. The numerical convex hull-based model selection procedure yielded 6 ‘hull’ solutions. Table 1 shows the percentage of goodness-of-fit values (*f*), total number of components (*s*), and scree test values (*st*) of the solutions on the higher boundary of the convex hull. As can be seen in the table, the numerical method suggested the selection of the model that considered five person components, three response components, and two situation components. In addition, the model that considered three person components, three

response components, and two situation components also seemed an interesting solution.

We inspected both solutions and found that the model that considered five person components, three response components, and two situation components was the model that could be best explained, whereas the other model did not have a clear substantive explanation. Therefore, we eventually decided to retain the model that considered five person components.

As all the scores were related to aggressive behavior, we decided that it would make sense to allow them to correlate after component extraction. Thus the person components were renormalized, as this typically has the effect of allowing person component scores to be correlated among themselves.

*Optimal simple structure of the selected solution*

We decided to rotate the solution in order to obtain a simple structure in the response components, the situation

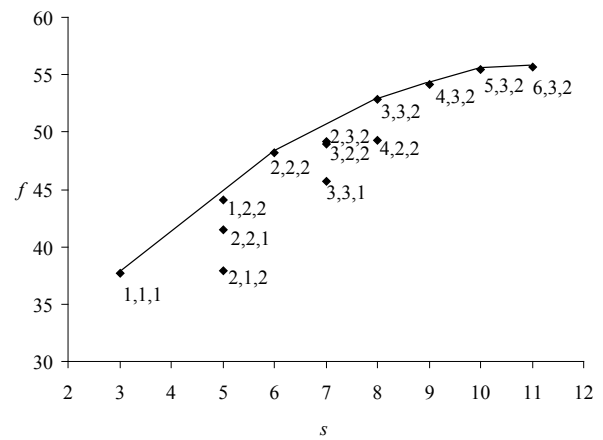


Figure 1. Plot of goodness of fit (*f*) versus the total number of components (*s*) for all the possible solutions, with the line representing the higher boundary of the convex hull.

Table 1

*Percentage of goodness-of-fit values (f) and total number of components (s), and screen test values (st) of the solutions on the higher boundary of the convex hull*

Person	Response	Situation	f	s	st
1	1	1	38.7%	3	-
2	2	2	48.2%	6	1.52
3	3	2	52.8%	8	1.74
4	3	2	54.1%	9	1.00
5	3	2	55.5%	10	5.72
6	3	2	55.7%	11	-

components, and the core matrix. We applied Kiers' (1998) procedure a number of times for joint varimax rotation of the core and component matrices. We set the relative weights for the response and situation components at value 1, and at 0 for the person component. The simplicity values for the response and situation components were 1.81, and 1.12, respectively. In addition, the related core matrix showed a simplicity value of 4.94. We also tried other possibilities for the weights (2, 3, 4, and 5). However, the improvement in the simplicity was minimum (less than .01) in all the matrices. Therefore, we eventually decided to keep the solution with the initial weights.

#### *Stability and residuals for the selected solution*

We carried out a stability check analysis. The sample was split in halves at random, and the data for both splits

were pre-processed and analysed in the same way as the full sample. The solution was quite stable: congruence values for the response and situation components were larger than .99. To inspect the stability of the core matrix (i.e. the matrix that relates person, response, and situation components), we computed the cores for the two splits, and observed that they were very similar: differences across splits were never larger than 1 and thus hardly affected the interpretation of the core matrices.

## Results

The analysis described in the previous section led to a three-way component solution that had a simple structure

Table 2

*Response component scores: values equal or larger than .30 are printed in bold face*

Response	To argue	To get angry	To fight
I argue with her	.64	-.08	.04
I feel that I cannot control myself	-.07	.80	.07
I hit her	-.18	.16	.70
I feel that I am about to explode	.21	.56	-.11
I shout at her	.38	-.04	.30
I give her a push	.15	-.12	.62
I feel really upset	.59	.09	-.13

*Note.* Responses were translated from Spanish using the back translation method. The original ones can be obtained from the authors. The responses printed in the table are taken from the questionnaire given to girls.

Table 3

*Response component scores: values equal or larger than .30 are printed in bold face*

Situation	Relatives	Unknown
Your parents don't like your boyfriend and forbid you from seeing him again.	<b>.61</b>	-.01
You are queuing up for the cinema. After half an hour's wait, someone you don't know pushes you aside, insults you and pushes in.	.05	<b>.50</b>
During a family dinner. Everybody criticizes you and accuses you of being useless.	<b>.59</b>	.00
You are in a shopping centre and there are a lot of people about. Someone you don't know comes up to you, hits you and yells at you to stop looking at her like that.	-.15	<b>.73</b>
Your family takes an important decision that directly affects you but they have not consulted you.	<b>.47</b>	.00
Someone you don't know tips her tray of food over you. She pushes you and keeps shouting that it is your fault and that you have to pay her the cost of her meal.	.19	<b>.46</b>

*Note.* Situations were translated from Spanish using the back translation method. The original ones can be obtained from the authors. The responses printed in the table are taken from the questionnaire given to girls.

and was stable. We shall now present in detail the component scores, and their relationships with external variables.

### Component scores

Table 2 shows the component scores for the responses. The first response component was related to two verbal aggressive behaviors (to argue with people and to shout), so we labelled it *To argue*. The responses that labelled high on the second component were related to getting angry, so we labelled it *To get angry*. The third component was mainly defined by two physically aggressive behaviors, so we labelled this component *To fight*. It must be said that the three components were in fact expected. However, two behaviors have a bit different profile. First, *I feel really upset* was expected to be related to anger, instead of typical verbally aggressive behaviors. Second, *I shout at her/him* had a complex profile, and was related not only to verbally aggressive behaviors, but also to the physically aggressive behaviors. It is likely that physically aggressive behavior does not occur in isolation in real troubled situations, but is accompanied by other aspects of the aggressive behavior (such as shouting).

Table 3 presents the component scores for the different situations. We labelled the first component as *Situations with relatives* (summarized as *Relatives*). The second component was defined by situations in which a strange person generates a troubled situation. We labelled the component as *situations with unknown people* (summarized as *Unknown People*). These two components appeared as expected when the inventory was developed.

To interpret the person components, one must inspect the core array presented in Table 4. The largest values in the core matrix point out the relationships between response, situation, and person components. As the table shows, each person component is strongly related to one different interaction between response and situation components. Therefore, person components were labelled *To argue with relatives* (AR), *To get angry with relatives* (GAR), *To argue with unknown people* (AUP), *To get angry with unknown people* (GAUP), and *To fight against unknown people* (FUP). It can be seen that the interaction *To fight* × *Relatives* did not substantially load in any component. Please, note that the relatives involved in the situations are directly (or indirectly) related to parents. It could be interpreted that adolescents do not really fight against their parents.

Table 4

Core array: values equal or larger than 10 are printed in bold face

Interaction of response and situation components	Person components				
	1	2	3	4	5
To argue × Relatives	<b>44.53</b>	.00	-.03	.00	.09
To get angry × Relatives	.04	<b>29.42</b>	.02	.00	-.05
To fight × Relatives	-1.61	.40	-1.36	-.11	4.28
To argue × Unknown people	-.04	.02	<b>39.43</b>	-.01	.08
To get angry × Unknown people	.00	.00	.01	<b>28.86</b>	-.01
To fight × Unknown people	.08	-.03	.06	.00	<b>48.95</b>

Table 5

Correlation matrix among person components

Person components	Relatives		Unknown people	
	To argue	To get angry	To argue	To get angry
To get angry with relatives	.20 *			
To argue with unknown people	.67 *	.17 *		
To get angry with unknown people	.28 *	.35 *	.25 *	
To fight with unknown people	.19 *	.18 *	-.04	.20 *

Note. \* $p < .01$

The correlation between person components is presented in Table 5. AR and AUP showed a large correlation among them (.67). This would mean that those individuals who tend to react by getting involved in an argument do so indifferently of whether this is with relatives or unknown people. The same pattern of behavior is related to individuals that get angry. However, the relationship among components GAR and GAUP is not so strong (correlation of .35). The correlation between FUP and AUP showed a non-significant correlation (close to zero), that would mean that individuals that fight with unknown people do not argue with them more than average. The rest of the correlations were significantly larger than zero and ranged between .17 and .28. As all the components were related to aggressive behaviors, it is expected that components would show a certain degree of correlation among them.

Table 6 shows the correlations between the person components with the scales of AQ (Physical, Verbal, Anger, Hostility, and the overall Total) and the dysfunctional scale of DII. As can be seen the Physical and Anger scales of AQ, the overall Total of AQ and the Dysfunctional scale of DII tended to show positive relationships with the person component FUP. The Physical scale correlated negatively with the person component AUP. This result reinforced the interpretation that individuals that fight with unknown people do not argue with them. The Anger scale of AQ also correlated with the person component GAR, whereas the correlation with GAUP was non-significant. Finally, it must be noted that the Verbal scale of AQ was independent of the person components related to arguing (AR and AUP).

Finally, as it has been shown in previous studies, men have higher scores in the physical scale of AQ than women (14.17 versus 10;  $p < .01$ ), and also have higher scores than women in the fight against unknown people component (52.1 versus 48.24;  $p < .01$ ).

Discussion

As has already been pointed out, we approached the study of aggressive behaviors related to adolescents

using a multi-way model that considered three modes: individuals, three kinds of aggressive behaviors (physical, verbal, and getting angry), and two kinds of situations (some related to relatives, and others related to unknown people). The interaction among the three modes showed enough variance as to justify our approach. In addition, the proportion of explained variance, as well as the simplicity obtained in the different component scores allowed a clear substantive explanation of the relationship among the modes.

Although the relationships between the person components show a certain degree of stability of behaviors across situations (i.e. people who argue with unknowns also tend to argue with relatives, etc.), our results also show the relevance of situational components (i.e. there is a physical aggression component against unknowns but the same component was not found for relatives). Furthermore, the presence of a three way interaction between the three modes shows that there is a modulation of individuals' aggressive behaviors across situations.

An important aspect to discuss is the pattern of relationships among person components and external variables. Aggression measures (especially physical aggression and anger) and impulsivity are specifically related to person components linked to physical aggression (fight with unknown people). These results seem to be closely related to Barrat's proposal of impulsive aggression (Barratt, 1991, 1994). Barratt (1994) proposed that some people are predisposed to responding to certain stimuli or situations with feelings of anger that may lead to an aggressive response. If such a predisposition is combined with a high level of impulsivity, then the difficulty of inhibiting responses that is characteristic of impulsive individuals involves a low response control and this facilitates aggressive behavior. Furthermore, this aggressive behavior is closely related to physical aggression in the general population and especially in adolescents (Vigil-Colet, Morales-Vives & Tous, 2008). Our data fit quite well with this proposal. As Table 6 shows, the anger scale of AQ and Dysfunctional impulsivity are positively related to fight with unknown people, which is the more uncontrolled kind of aggression, whereas only anger is slightly related to one of the person

Table 6  
Correlation matrix among person components, aggression questionnaire scales, and dysfunctional impulsivity

	Physical	Verbal	Anger	Hostility	AQ Total	Dysfunctional
To argue with relatives	-.15	.02	.04	.02	-.05	-.03
To get angry with relatives	.02	.03	.17 *	.12	.12	.07
To argue with unknown people	-.22 *	.01	-.02	.12	-.08	-.01
To get angry with unknown people	.13	.11	.13	.04	.16	-.03
To fight with unknown people	.51 **	.12	.27 **	-.05	.37 **	.22 *

Note. \*\* $p < .01$ ; \* $p < .05$



components related to it (get angry with relatives). It seems that the aggression measure provided by classical questionnaires such as the AQ can only predict the physical manifestations of aggression against unknown people. On the other hand, the physical scale of the AQ is negatively related to the person components AR and AUP. This seems to indicate that high levels of physical aggression imply that physical strategies rather than arguing are favored when trying to solve problematic situations. It should be interesting to test in future research if this is a specific characteristic of adolescents, taking into account that in adolescents' feelings of anger are much more related to physical aggression than to verbal aggression while in adult samples the pattern is reversed, with anger being more related to verbal aggression (i.e. to arguing) than to physical aggression (Vigil-Colet & Codorniu-Raga, 2004; Vigil-Colet, Morales-Vives & Tous, 2008). Consequently the pattern of relationships relating person components and external measures in adult samples may differ from the one found in adolescents.

Referring to gender effects, as Archer's meta-analytic study (2004b) pointed out, gender effects on the AQ are mainly found on the Physical scale. Our data are in the same vein but, when we analyse gender effects on person components, the results shows some interesting issues. First, men have higher scores than women in the component related to physical aggression while women showed higher scores in the component related to get angry, but only when the person who starts the aggressive behavior is a relative. This kind of result indicates that the use of questionnaires which take into account the situational component of aggression may give complementary information about gender effects on aggression measured by classical methods. This is because gender effects that are not present in classical measures may be present when we take into account the situational aspects of behavior.

It must be pointed out that three-way component analysis aims to summarize the information contained in a data set: in this sense, the dimensions are more *components* (in the sense of principal component analysis) than *factors* (in the sense of factor analysis). It should not be interpreted that we aim to put anger, physical and verbal aggression all in the same *construct*. The idea is that these behaviors are *observed* together under certain situations.

Our study showed certain limitations related to the troubled situations included in the questionnaire. The relatives that we considered were members of the family that have a position of power over the respondent. The study could be extended to relatives with a closer status in the family (such as brothers, sisters, or cousins). In addition, the situations related to relatives could include more aggressive components against the respondent (such as "your mother slaps you unfairly"). All these additional insights could be considered in further questionnaires that

studied the aggressive components among relatives. Such a study should select a sample of adolescents who have the kind of relatives included in the questionnaires.

Another limitation to our questionnaire was that the unknown person was defined as a person of the same sex as the respondent. However, more complex situations could be considered in future studies. A more complex approach could help to determine if there is a differential behavioral signature among sexes when the troubled situation is caused by an unknown person of either the same or the opposite sex. Again, a specific questionnaire could be developed to study this or the same questionnaire could be used but with the other gender.

We must point out that, even though we had a hypothesis related to the maximum number of components for the behaviors and the situations, we also inspected solutions with more dimensions. However, none of them turned out to be interpretable or stable.

Other kinds of situations could also be considered such as those involving different people (not just relatives and unknown people). For example, exploring the expression of aggressive behavior in situations related to close friends could be interesting, as could studying situations with known people that are not friends, such as other individuals in a classroom or a sports team. This is a relevant issue because as we stated in the introduction power relations may modulate aggression expression, so could be interesting to introduce other nonrelated individuals with power over the respondent such as teachers, etc.

Among the different aggression classifications, two of the more often used are direct versus indirect and proactive versus reactive. The differentiation between direct versus indirect refers to the extent that the aggressor is personally involved, while the differentiation between proactive and reactive refers to the fact that aggressive behavior is executed as a way to achieve a goal or as a reaction to another aggression. Taking it into account, it should be mentioned that all the situations referred to in the questionnaire are much more related to reactive aggression than to proactive aggression and all of them refer to direct forms of aggression. In this sense, all the items describe situations in which the individual has to react to a situation which is perceived as a threat and, consequently, aggressive behavior is a direct reaction against this situation, rather than a way to fulfill a premeditated objective. From this viewpoint, it seems necessary to develop complementary instruments which take into account both situations related to proactive forms and indirect forms of aggression.

To summarize the results reported above, three-mode analyses has shown its value as a tool to develop a new approach to aggressive behavior measurement. As Mishel (2009) pointed out, if we want to understand personality we need to understand how different people distinctively interpret and process situations in ways that generate their

characteristic patterns of interactions with them. The kind of analysis proposed in this paper may reach this objective by allowing us to define and measure these patterns of interactions obtaining a more accurate assessment of individual's behavior.

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**APPENDIX 1****EXAMPLE TO SHOW THE FORMAT USED TO PRESENT EACH SITUATION TO THE PARTICIPANTS****SITUATION:**

You are in a shopping centre and there are a lot of people about. Someone you don't know comes up to you, hits you and yells at you to stop looking at her like that.

**RESPONSE:**

- I argue with her
- I feel that I cannot control myself
- I hit her
- I feel that I am about to explode
- I shout at her
- I give her a push
- I feel really upset