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Validation of the Spanish version of the Cardiff Anomalous Perceptions Scale in the general population

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Introduction. Interest in the existence of anomalous perceptions in the general population has increased greatly over recent years. Because of this, it has been possible to extend the knowledge regarding the theory of psychosis as a dimensional model. This study has aimed to validate the Spanish version of the Cardiff Anomalous Perceptions Scale (CAPS) the general population.

Method. A descriptive, controlled and cross-sectional study was performed. It evaluated 324 participants from the general population with the Spanish translation of the CAPS, the 21-item Peter et al. Delusions Inventory, the Revised Launay-Slade Hallucinations Scale and the reduced Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE).

Results. The results indicate that the Spanish version of the CAPS has good internal consistency and test-retest reliability. Analysis of the relationship with other scales indicates evidence of good convergent and divergent validity and the exploratory and confirmatory factor analysis of the CAPS showed a structure with three consistent factors.

Conclusions. The Spanish version of the CAPS is a valid and reliable psychometric measure of the anomalous perceptual experiences in the general population.

Key Words: CAPS, Psychosis continuum, Anomalous experiences, Schizophrenia, Hallucination

Actas Esp Psiquiatr 2014;42(1):1-8

Validación de la versión española de la Escala de Percepciones Anómalas de Cardiff en población general

Antecedentes. En los últimos años se ha incrementado el interés por la existencia de alteraciones de la percepción en la población general, esto ha contribuido a profundizar en la teoría de la psicosis como un modelo dimensional. El objetivo del presente estudio es el de validar la versión española de la escala de Percepciones Anómalas de Cardiff (CAPS) en población general.

Método. Estudio descriptivo, controlado y transversal en el que se evaluó a 324 sujetos de población general con la CAPS, el Inventario de Ideas Delirantes de Peters de 21 ítems, con la Escala revisada de Alucinaciones de Launay-Slade y el Inventario reducido de Oxford-Liverpool de Sentimientos y Experiencias.

Resultados. Los resultados demuestran que la CAPS en su versión española posee buena consistencia interna y una adecuada fiabilidad test-retest. Las correlaciones con las demás escalas proporcionan evidencia de una buena validez convergente-divergente y el análisis factorial exploratorio y confirmatorio de la CAPS reflejaron una estructura de tres factores consistente.

Conclusiones. La versión española de la CAPS es un instrumento de evaluación psicométrica fiable y válido para la medición de las experiencias anómalas en población general.

Palabras clave: CAPS, Continuum psicosis, Experiencias anómalas, Esquizofrenia, Alucinaciones

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INTRODUCTION

The diagnosis of psychosis has typically been made in accordance with categorial parameters. In recent years, interest has grown about a dimensional view in which the classically conceived experiences in the psychotic setting as thinking and communication alterations would be distributed continually in the general population.^{1,2} The multifactor origin, which covers from genetic alterations to environmental risk factors, would modulate the appearance of different clinical expressions from normality to clinical psychosis.³⁻¹²

For van Os (2009), the prevalence rate of subclinical psychotic experiences in the general population is 5%¹³⁻¹⁷. Therefore, the experience of symptoms similar to those of psychoses would not be unavoidably associated to this disorder, but would depend on the frequency of appearance, intrusiveness, presence of other associated symptoms, and individual, personal and cultural factors (coping capacity, behavior regarding the disease, social tolerance, or development of functional relations with the others).¹⁸⁻²³

Development of psychometric measures to evaluate the presence of psychoses and "psychosis-like" experiences has made it possible to go deeper into the dimensional model.

Some of the scales aim to evaluate the tendency towards psychosis while others focus on special aspects of the continuum (as delusions or hallucinations), influences by the limits of the symptoms in the psychiatric setting.²⁴⁻²⁷ Many of the scales are not limited to the exclusive evaluation of the presence of anomalous perceptions, but rather the evaluations are mixed together with alterations of other psychic functions, as, for example, in the Launay-Slade Hallucinations Scale-Revised ("*The sounds I hear in my daydreams seem so real that I sometimes think they exist*").

Cardiff Anomalous Perceptions Scale (CAPS) makes it possible to use a psychometric test to measure exclusively the perception alterations. It is not dependent on the clinical psychiatric context and it considers the subjective experiences in a range including different grades of *insight* (it includes the knowledge that the perception "is really not there," the perception seems strange or unusual). Furthermore, they include items related with distortions in perceptive intensity and experiences associated to all the sensorial modalities, together with others typically related with the temporal lobe.²⁴

This article has aimed to adapt and validate the Cardiff Anomalous Perceptions Scale for the general population into Spanish.

MATERIAL AND METHODS

This is a descriptive, controlled and cross-sectional validation study. The sample was obtained through non-

probability incidental type sampling, this being representative of the study population.

The Ethics Committee of the University Hospital Reina Sofía de Córdoba and that of the University of Córdoba approved the protocol and it complies with the principles of the Declaration of Helsinki.

Participants

The study sample was made up of 324 2nd-year Medical Degree students in Córdoba who had not taken any subject in the area of Psychiatry. Five subjects were excluded from the analysis because their questionnaires were incompletely filled out. Finally, the sample was made up of 319 subjects (mean age=20.12; SD=2.43; range=18-43). Of these, 220 were women (69%) and 99 men (31%) and 81.1% were single and 16.9% with a partner.

Evaluation instruments

*Cardiff Anomalous Perceptions Scale, CAPS.*²⁴ This questionnaire is made up of 32 items having a Yes/ No dichotomic format. Total score is obtained by adding up each one of the items, so that the range for the CAPS is 0 (low) to 32 (high). Furthermore, each one of the items has 3 dimensions that measure the grade of distress, intrusiveness and frequency with a Likert (1-5) scale, so that the range for each one of them goes from 0 to 160. Each one of the three dimensions seeks to evaluate the relevance of the experience for the subject. This has been described as fundamental for the differentiation between a normal and pathological experience and not the mere experience itself. After discussing the scale with the author, the possibility of changing the term "perturbación" (term used in Spanish meaning disturbance or disorder) for "malestar" (malaise -original term used in English was distress) in future versions of the CAPS scale was proposed.

21-item Peters Delusions Inventory, PDI-21.^{28,29} This is a 21-item self-report having a Yes/No dichotomic format, in which the total score is obtained from the sum of each one of the items, so that the maximum score obtained would be 21. It also includes three subscales that measure grade of conviction, preoccupation and malaise. In these, a Likert type (1-5) score system is used (higher scores are associated to greater tendency to delusional ideas). In the present work, we have used the Spanish version of the instrument, which has shown a total Cronbach's alpha of 0.75.

*The Launay-Slade Hallucination Scale-Revised, LSHS.*³⁰ Spanish Version.^{31,32} In this study, we used the 12-item Spanish version (Cronbach's Alpha 0.83), which uses a Likert type response format (1= "Certainly does not apply to me", 2= "Possibly does not apply to me", 3= "Possibly applies to

me", 4= "Certainly applies to me"). The scores range from 12 to 48. The higher the score, the greater the tendency to have hallucinations.

*Reduced version of Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE-R).*³³ Reduced version of the original, made up of 40 items with greater factor weight, all of them with dichotomic response. The scale offers scores for four scales: Cognitive Disorganization, Introvertive Anhedonia, Unusual experiences and Impulsive Nonconformity. The correction of each scale was performed by counting the corresponding items answered as expected.

Procedure

After obtaining the author's permission, CAPS was translated into Spanish using the *back-translation* method and following the international guidelines for the translation and adaptation of the test. Finally, it was sent for approval to the original author.

The participants filled out the questionnaires one time collectively in groups of approximately 60-70 students during school hours and in rooms prepared for this purpose. The study was presented to the participants as research on anomalous perceptions and they were assured of the confidentiality of the data and voluntary and unpaid character of their participation, confirming their consent to be included. The presence of an investigator was assured at all times. A total of 71 participants filled out the CAPS a second time six months later.

Statistical analysis

The statistical analysis was performed with the SPSS 20 program. Bilateral statistical significance level used was 0.5. Internal consistency of the total CAPS and of the subscales was calculated with Cronbach's alpha. Test-retest reliability was calculated with Pearson's correlation coefficient.

Convergent validity was determined with Pearson's correlation coefficient between the total score of the CAPS and the scores on the PDI, RLSHS and OLIFE-R scales.

To analyze the dimensional structure of the CAPS, first of all, an exploratory factor analysis was made using the principal components analysis (CPA) in order to establish a model with predictive power. The CPA retains those characteristics of the combined data that most contribute to its variance, maintaining an order of low level of the principal components and ignoring those of high level. The purpose is that these low order components sometimes contain the "most important" aspect of this information. At first, an oblimin rotation was made, as had been done in the validation of the original scale by the questionnaire author,

but as the correlation between the final factors were small, we decided to make a more robust factor analysis, applying an orthogonal rotation. After, we used the statistical program Amos 20 to carry out the Confirmatory Factor Analysis of the model obtained, in order to verify the adaptation of the exploratory model, considering the number of factors, items that saturate each factor and specifying correlated measurement errors, so that we could obtain the relationship between constructs, and the validity of said constructs.

A problem with goodness of fit statistics is that they deteriorate as the sample size increases. Thus, samples such as ours with more than 200 cases give good guarantees, and would adapt the ratio between sample size and variable (+10 subjects/variable observed).

RESULTS

Descriptive statistics

Table 1 shows the descriptive statistics for the CAPS, PDI-21, RLSHS and OLIFE. We did not find statistically significant differences in relation to gender on the Mann-Whitney U Test so that we assume that there are no differences between both groups except for the Impulsive non-conformity of the OLIFE-R scale.

Reliability

The CAPS scale obtained good internal consistency, with a Cronbach's alpha of 0.83 for the total score of the CAPS; 0.88 for the distress subscale; 0.87 for intrusiveness and 0.85 for frequency. On the Test-retest, the following Pearson correlation coefficients were obtained: CAPS total score=0.602 ($p<0.01$); CAPS distress=0.570 ($p<0.01$); CAPS intrusiveness=0.555 ($p<0.01$); CAPS frequency=0.592 ($p<0.01$). Cronbach's alpha for the test-retest was 0.75, showing acceptable stability.

Convergent-divergent validity

Pearson's correlation coefficient between the total score on the CAPS scale and that of the remaining scales is shown in Table 2.

Construct validity

The principal components analysis was carried out to study the association existing between the items, without considering any previous hypothesis. The items on the CAPS that were positively answered by less than 10% of those

Table 1 Descriptive statistics for the CAPS, PDI-21, OLIFE-R and RLSHS

Scale (total N)	CAPS (319)				PDI-21 (319)				OLIFE-R(319)				RLSHS (319)
Men/Women N	99/220				99/220				99/220				99/220
Subscale	Total	Distress	Intrusiveness	Frequency	Total	Malaise	Preoccupation	Conviction	IE	CD	IA	IN	
Men, mean (SD)	8.27 (4.99)	16.62 (14.04)	15.41 (12-87)	16.35 (11.40)	4.23 (2.87)	9.84 (8.68)	9.00 (7.67)	10.44 (8.41)	1.82 (1.37)	4.89 (2.91)	1.45 (1.84)	3.77 (1.9)	18.18 (4.24)
Women, mean (SD)	8.89 (5.62)	17.95 (15.6)	15.26 (12.46)	18.63 (14.25)	4.22 (2.54)	10.26 (8.30)	9.33 (7.73)	10.7 (7.4)	1.98 (1.78)	5.45 (2.39)	1.25 (1.66)	2.99 (1.78)	18.68 (4.66)
Total, mean (SD)	8.7 (5.4)	17.54 (15.13)	15.31 (12.57)	17.92 (13.45)	4.22 (2.64)	10.13 (8.41)	9.22 (7.70)	10.62 (7.71)	1.94 (1.66)	5.28 (2.57)	1.31 (1.7)	3.23 (1.85)	18.52 (4.53)
Range	0-26	0-90	0-70	0-111	0-14	0-58	0-56	0-49	0-8	0-10	0-10	0-9	0-40
Median	8	14	13	17	4	8	8	9	2	5	1	3	18

IA: Introverted Anhedonia. CAPS: Cardiff Anomalous Perceptions Scale. CD: Cognitive disorganization. IN: Impulsive Nonconformity. UE: Unusual experiences. OLIFE-R: Oxford-Liverpool Inventory of Feelings and Experiences - Revised. PDI-21: The 21-item Peters et al. Delusional Inventory. RLSHS: The Revised Launay-Slade Hallucinations Scale

Table 2 Correlation between the total score of CAPS and PDI-21, Subscales of O-LIFE-R and RLSHS (with Fisher's Z transformation of Pearson's r)

CAPS Total score	PDI-21 Total score	OLIFE-R				RLSHS
		Unusual experiences	Cognitive disorganization	Introverted Anhedonia	Impulsive non-conformity	
Pearson'sr	0.58**	0.50**	0.26**	0.09	0.22**	0.56**
Fisher'sZ	0.66	0.55	0.27	0.09	0.22	0.63

CAPS: Cardiff Anomalous Perceptions Scale. OLIFE-R: Oxford-Liverpool Inventory of Feelings and Experiences - Revised. PDI-21: The 21-item Peters et al. Delusional Inventory. RLSHS: The Revised Launay-Slade Hallucinations Scale

** p<0.01.

surveyed were eliminated from the analysis due to their lack of variance. This led to the elimination of 6 items: item 7 (6.6%), item 10 (5%), item 11 (8.5%), item 19 (5.3%), item 28 (2.5%) and item 31 (8.2%). Measure of Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) obtained was 0.82, which substantially exceeds the recommended value (0.6). The Bartlett sphericity test was also positive ($\chi^2=1314.588$ $p=0.000$). These values indicate that our matrix is not identical, and that they can be grouped into a smaller number of factors. The ACP revealed the presence of 8 factors with values above 1 and which, as a whole, explained 52.36% of the total variance of the results. The scree test showed a rupture between component 3 and 4. In this way, we performed an additional ACP with the extraction of 3 components. The factor loads of this analysis are shown in Table 3, After the rotation and after a factor load was considered as satisfactory in order to incorporate it into the 0.40 model, the three factors constructed as follows explain 30.46% of the variance: Factor I items 21, 18, 30, 25, 29, 20

and 8; factor II items 15, 26, 9, 3, 22, 5, 27, 23 and 17; and factor III 13, 4, 6, 32, 24, 2 and 12.

We begin with the model obtained in the exploratory factor analysis, including all the variables in order to evaluate their quality. The following statistics of goodness of fit were obtained: $P=0.001$ CMIN/DF=1.327; CFI=0.915; TLI=0.905; GFI=0.929; RMSEA=0.032.

The first global diagnosis of the model was performed with the Chi square likelihood ratio statistics. Its null hypothesis establishes that the restrictions of the model are correct. In our case, the null hypothesis was rejected. However, the degrees of freedom (DF) below three indicates that a good fit was obtained for samples larger than 200. The rest of the fits were close to 0.90. Thus, although we estimated that it is a relatively good fit in the first contrast of the model for the study sample and type of questionnaire, we believe that it should be improved. To do so, we are

Table 3 Factor weights obtained after the Principal Components Analysis (varimax rotation)

Item	Components		
	I	II	III
21. Do you ever think that food or drink tastes much stronger than it normally would?	0.651		
18. Do you ever find that common smells sometimes seem unusually different?	0.606		
30. Do you ever notice that food or drink seems to have an unusual taste?/	0.578		
25. Do you ever find that common smells sometimes seem unusually different?	0.577		
29. Do you ever experience smells or odors that people next to you seem unaware of?	0.533		
20. Do you ever find that your skin is more sensitive to touch, heat, or cold than usual?	0.520		
8. Do you ever detect smells which don't seem to come from your surroundings?	0.419		
14. Do you ever experience unexplained tastes in your mouth?	0.357		
15. Do you ever find that sensations happen all at once and flood you with information?		0.581	
26. Do you ever think that everyday things look abnormal to you?		0.563	
9. Do you ever have the sensation that your body, or a part of it, is changing or has changed shape?		0.547	
3. Do you ever hear your own thoughts repeated or echoed?		0.495	
22. Do you ever look in the mirror and think that your face seems different from usual?		0.472	
5. Do you ever experience unusual burning sensations or other strange feelings in or on your body?		0.471	
27. Do you ever find that your experience of time changes dramatically?		0.452	
23. Do you ever have days where lights or colors seem brighter or more intense than usual?		0.447	
17. Do you ever have difficulty distinguishing one sensation from another?		0.442	
1. Do you ever notice that sounds are much louder than they normally would be?		0.389	
16. Do you ever find that sounds are distorted in strange or unusual ways?	0.318	0.352	
13. Do you ever hear voices saying words or sentences when there is no one around that might account for it?			0.608
4. Do you ever see shapes, lights, or colors even though there is nothing really there?			0.559
6. Do you ever hear noises or sounds when there is nothing about to explain them?			0.550
32. Do you ever hear sounds or music that people near you don't hear?	0.344		0.430
24. Do you ever have the feeling of being uplifted, as if driving or rolling over a road while sitting quietly?			0.416
2. Do you ever sense the presence of another being, despite being unable to see any evidence?			0.416
12. Do you ever feel that someone is touching you, but when you look nobody is there?			0.400

working with the residuals of the covariance, warning that the residuals for some variables are too high. The modifications were made sequentially, re-examining the results. After items 8, 22, 29 and 17 were eliminated from the model, a new calculation was made of the goodness of fit parameters, obtaining the following results: $P=0.101$; $CMIN/DF=1.150$; $CFI=0.965$; $TLI=0.960$; $GFI=0.950$; $RMSE=0.022$. This model has a very good fit beginning with the standard criterion that most of the authors have that they are greater than or equal to 0.95 and the RMSN is less than 0.08. The factors were finally composed as follows: Factor I (called "changes in the quality of perception"): Items 21, 18, 30, 25 and 20; Factor II (called "depersonalization, derealization experiences"): 15, 26, 9, 3, 5, 27 and 23; and

finally Factor III (called "temporal lobe associated experiences"): 13, 4, 6, 32, 24, 2 and 12. The final distribution of the items in relation to the factors is shown in table 4.

DISCUSSION

The objective pursued when validating the CAPS scale into Spanish was to obtain a measurement instrument that would make it possible to adequately evaluate anomalous perceptions in the general population. The results of the study suggest that the Cardiff Anomalous Perceptions Scale (CAPS) is a reliable and valid psychometric evaluation instrument for the evaluation of the presence of anomalous perceptions.

Table 4

Distribution after the confirmatory factor analysis of the items in each one of the factors

Factor I. Changes in the quality of the perception.

- 21. Do you ever think that food or drink tastes much stronger than it normally would?
- 18. Do you ever find that common smells sometimes seem unusually different?
- 30. Do you ever notice that food or drink seems to have an unusual taste?/
- 25. Do you ever find that common smells sometimes seem unusually different?
- 20. Do you ever find that your skin is more sensitive to touch, heat, or cold than usual?

Factor II. Experiences of depersonalization-derealization.

- 15. Do you ever find that sensations happen all at once and flood you with information?
- 26. Do you ever think that everyday things look abnormal to you?
- 9. Do you ever have the sensation that your body, or a part of it, is changing or has changed shape?
- 3. Do you ever hear your own thoughts repeated or echoed?
- 5. Do you ever experience unusual burning sensations or other strange feelings in or on your body?
- 27. Do you ever find that your experience of time changes dramatically?
- 23. Do you ever have days where lights or colors seem brighter or more intense than usual?

Factor III. Experiencias associated to the temporal lobe.

- 13. Do you ever hear voices saying words or sentences when there is no one around that might account for it?
- 4. Do you ever see shapes, lights, or colors even though there is nothing really there?
- 6. Do you ever hear noises or sounds when there is nothing about to explain them?
- 32. Do you ever hear sounds or music that people near you don't hear?
- 24. Do you ever have the feeling of being uplifted, as if driving or rolling over a road while sitting quietly?
- 2. Do you ever sense the presence of another being, despite being unable to see any evidence?
- 12. Do you ever feel that someone is touching you, but when you look nobody is there?

The total score of the CAPS in our sample of 8.70 was very similar to that described by Bell et al.²⁴ We found slightly higher scores for women (8.89) compared to that described by Bell et al.²⁴ (6.3), this finding not having clinical significance. The total scores and those obtained in the distress, intrusiveness and frequency dimensions were very similar to those found in the original study for the British sample.

Internal consistency for the total CAPS score and for the score for distress, intrusiveness and frequency widely surpass the value of 0.70 (0.83; 0.88; 0.87; and 0.85, respectively), which is that used to indicate adequate reliability. This result confirms those obtained in the validation study and supports the use of the CAPS scale for the evaluation of anomalous perceptions in the general population. The test-retest reliability obtained in this study was lower than that obtained by Bell et al.²⁴, which may be because the period between the first and second observation was too long (6 months) and that during that time, the subjects subjected to study began with their educational contents, both psychological and psychopathological. Therefore, we consider that taking type of scale this is into consideration,

the values obtained close to 0.60 and reliability of 0.75 show us that there is adequate temporal stability, although a new verification would be necessary with a sample having less time between both measurements and without intervening factors that could alter said measurement.

The convergent-divergent correlation coefficients obtained between the CAPS scale and the remaining scales were very similar to that described by Bell et al.,²⁴ except in the RLSHS scale in which we obtained a slightly lower correlation (0.56) compared to that obtained in the original study (0.65). The highest correlations were found between those scales that belonged to the same construct (RLSHS ($r=0.56$), unusual experiences subscale of OLIFE ($r=0.5$) and the PDI-21 ($r=0.58$). Those subscales that did not form a part of the anomalous experiences construct (cognitive disorganization ($r=0.26$), introvertive anhedonia ($r=0.09$) and impulsive nonconformity ($r=0.22$) showed very low correlations.

The results obtained in the factor analysis, whose model explained 30.46% of the variance, showed a first component we have called "changes in the quality of perception" and

that has a very high correspondence with the second factor found by Bell et al.²⁴ As in the original work, this factor is made up of items related with changes in the perceptive intensity and strange perceptions.

The second component groups a series of unusual experience of different origin, which we call "depersonalization and derealization experiences." Although some of these items could be associated with psychosis in general, they seem to obtain greater coherence when they are explained in the context of these phenomena, which have been described in the general population usually in a transitorily and associated to fatigue, severe distress and consumption of psychoactive substances. Some studies estimate that there is a prevalence in the general population of up to 46% although only 1-2% would have clinically significant symptoms.^{34,35} Sierra mentions the presence of cognitive alterations (evocations, recalls, thoughts) that accompany feelings of unreality and feelings of automation that may not only affect motor behavior but also thinking, language or memory. In this context, item 3 (Do you ever hear your own thoughts repeated or echoed?) should be understood not as a first range symptoms of Schneider but rather as a combination of cognitive alterations (thought) with a feeling of automatism.³⁶ In the same way, the presence of visual perceptual alteration is described, understanding these as the increase or decrease of the experience of colors or the impression that there are strangely flat. This is the context in which item 23 should be interpreted (Do you ever have days where lights or colors seem brighter or more intense than usual?), also included by Sierra et al. in this factor.^{37,38} Item 5 (Do you ever experience unusual burning sensations or other strange feelings in or on your body?) belongs to the group of symptoms due to *desomatization*, defined by the decrease, loss or alteration of the body sensations and sensation of lack of corporeality, with the possibility of an altered pain threshold.³⁹

The third component, called "temporal lobe experiences," is made up of items that can be included within the perceptual alterations described in the temporal lobe disorders better than among the first range symptoms of the psychosis. In the context of temporal lobe epilepsy, perceptual alterations that include visual delusions and hallucinations, auditory delusions and musical hallucinations, distortions of perception of time, unusual taste and smell experiences and feelings of familiarity and recognition. The perceptive alterations described by Gloor are therefore adequately represented by the items making up this factor.⁴⁰⁻⁴⁴

Principal limitations of this study are its long time period between the first and second observation (6 months), which would make a new measurement with a shorter period recommendable. Similarly, even though the sample is statistically representative, the fact that the origin of the sample is limited to Cordoba (Spain) and that the subjects

are university students could hinder the extrapolation of the results. In summary, in accordance with the results obtained, it has been demonstrated that the Spanish Version of the Cardiff Anomalous Perceptions Scale (CAPS), as the English version, is a reliable and valid psychometric evaluation instrument for the measurement of abnormal experiences in the general population.

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