



Distributors of Psytech International

Assessment Instrument and Software

Critical Reasoning Test Battery (CRTB2)

**South African User Guide and
Research Reference**

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Critical Reasoning Test Battery (CRTB2)

Introduction

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This guide is for users and potential users of the Critical Reasoning Test Battery (CRTB2).

It should be used in conjunction with the Critical Reasoning Test Battery (version 2) Technical Manual published by Psytech International.

This guide does not replace the Technical Manual, but it is intended to provide the additional information on the CRTB2 that South African users need.

This user guide will be updated regularly as new research evidence becomes available.

Psytech manuals are distributed on CD at nominal cost, and extracts and updates are published on the company's website from time to time. It is recommended that users print the manuals and update sections as new studies become available. Printed copies of the latest versions of the user guides can also be purchased from the company if users prefer not to download the document themselves.

Structure of this manual

The manual is divided into the following sections:

- **Introduction**
 - This section covers the background to the questionnaire, administration instructions and general advice on its use in South Africa.
- **Norms**
 - This section contains descriptions of the various norm groups available for the various subtests of the Critical Reasoning Test Battery – the composition of the norm groups, basic statistics on CRTB2 subtests and stanine tables.
- **Reliability**
 - This section contains reports on the reliability studies done on the Critical Reasoning Test Battery in South Africa – the composition of the groups, reliability coefficients and Standard Error of Measurement where suitable data exists.
- **Validity**
 - This section contains reports on the validation studies done on the Critical Reasoning Test Battery in South Africa
- **Differential item functioning**
 - This section reports on the differential item functioning for the tests in the Critical Reasoning Test Battery.

Studies will be added to the various sections as they are completed. The date when it was last updated appears on every study.

Every section has its own table of contents and introductory section.

Classification status of the Critical Reasoning Test Battery

The CRTB2 was submitted to the Psychometrics Committee of the Health Professions Council of South Africa in April 2001. The process of evaluation and classification is a lengthy one. Feedback reports received from the test reviewers indicate that the CRTB2 meets the requirements for classification as a psychological test and a classification certificate was issued in August 2010. The test battery is currently on the list of classified tests.

Conditions of use and professional responsibilities

The CRTB2 must be used under the control of a registered Psychologist, Psychometrist (Independent Practice), or Registered Counsellor.

Purchasing Critical Reasoning Test Battery materials and scoring services

When purchasing test materials or scoring services relating to the CRTB2, the signature and registration number of a Psychologist or Psychometrist (Independent Practice) or Registered Counsellor is required.

Constructing of test batteries

Only a Psychologist, Psychometrist (Independent Practice) or a Registered Counsellor may decide which tests or questionnaires to use for a particular purpose. Psychometrists registered for supervised practice or other role players such as HR Practitioners or line managers may not act independently of the psychology registered professional, and may not overrule their decisions in this regard.

Administration of the Critical Reasoning Test Battery

- The tests may be administered by a Psychologist, Psychometrist (Supervised Practice), Psychometrist (Independent Practice), Registered Counsellor or Psychotechnician.
- Psychometrists (Supervised Practice) have to be supervised by a Psychologist.

Scoring of the Critical Reasoning Test Battery

The CRTB2 may be scored by

- A Psychologist,
- A Psychometrist (Independent Practice),
- A Psychometrist (Supervised Practice),
- A Registered Counsellor, or
- A Psychotechnician,

The scoring of the CRTB2 is always done by computer. The act of scoring is pure data capture and no interpretation is involved.

Detailed instructions for scoring the CRTB2 by computer can be found on the GeneSys Online platform, under tutorials. There are videos and downloadable PDFs. Special training in the use of the software is available and we strongly recommend attending this.

Reporting on the Critical Reasoning Test Battery

The choice of which computerised report to use should be made by:

- A Psychologist or a Psychometrist (Independent Practice) or a Registered Counsellor.

Psychometrists (Supervised Practice) and Psychotechnicians should consult with a Psychologist about the most suitable report to use.

The choice of which norm group to use should be made by:

- A Psychologist or a Psychometrist (Independent Practice) or a Registered Counsellor.

Psychometrists (Supervised Practice) and Psychotechnicians should consult with a Psychologist about the most suitable norm group to use.

Feedback on Critical Reasoning Test Battery reports

Feedback on CRTB2 reports may be done by Psychologists, Psychometrists (Independent Practice) or Registered Counsellors. Psychometrists registered for supervised practice and Psychotechnicians may give feedback on the CRTB2 within clearly circumscribed guidelines laid down by a Psychologist, and provided proper supervision, with regular consultation, is maintained.

What the Critical Reasoning Test Battery measures

The CRTB2 consists of two tests that can be administered separately or together.

Verbal Critical Reasoning (CRTB2V)

Assesses the ability to understand semi-technical reports and draw accurate logical conclusions from such written information.

It can form a key assessment device for all managerial and professional jobs which require reliable interpretation of written reports and appropriate decision making.

Numerical Critical Reasoning (CRTB2N)

Measures the ability to understand and critically evaluate numerical information presented in tables, and accurately use this information in a logical way.

It can form a key assessment device for all managerial and technical positions which require a detailed understanding of financial, numerical and statistical data.

For detailed information about the constructs measured by the CRTB2, please consult the technical manual.

The technical manual gives an overview of the theoretical basis for the constructs, as well as a more in-depth discussion regarding the development rationale and the relationship of the CRTB2 to other measures of ability.

Administration options for the Critical Reasoning Test Battery

The subtests of the CRTB2 can be administered separately or together, and may be combined with other measures, such as measures of personality, learning potential or technical ability, to form a customised battery. The table below should help with the planning of a test battery:

Test	Time Limit	Pencil and Paper administration available	Computerised administration available
Verbal Critical Reasoning	15 minutes	Yes	Yes
Numerical Critical Reasoning	25 minutes	Yes	Yes

Respondents for whom the Critical Reasoning Test Battery is suitable

Level of Education

The CRTB2 is intended for respondents with graduate level qualifications, or respondents who are expected to function at a graduate level. If it is used on persons without tertiary qualifications, the test user must have good reason to believe that the respondent is functioning at a graduate level, or that the position for which a person is being evaluated, truly requires graduate level ability. It is important that suitable norm groups should be used, taking into account the educational levels of the respondents.

One must be sensitive to the fact that educational standards have differed considerably in South Africa. People from impoverished backgrounds are not likely to have had an education of the same standard as people from privileged backgrounds. The Psychology professional in charge of the assessment should evaluate the situation with care, taking into account the intended respondent's background, fluency in English and so forth. Every situation must be evaluated on its merits.

Proficiency in English

The test user should bear in mind that even persons with graduate qualifications can have widely varying levels of proficiency in English. The quality of a person's basic education can have an influence on his or her English comprehension, and with South Africa's history of educational inequalities, this cannot be ignored. If a respondent's first language is not English, the test user should carefully consider whether the Verbal Critical Reasoning test should be used, or whether perhaps the General Verbal Reasoning test from the General Reasoning Test Battery should be substituted for it. Some users have chosen to first use the General Verbal Reasoning Test, and then decide whether to apply the Verbal Critical Reasoning test after that.

Standardised tests of English proficiency from other sources, such as the Elsa-plus from Kaleidoprax, or the HSRC's standardised tests of English proficiency, can also be considered.

A history of the Critical Reasoning Test Battery in South Africa

The Critical Reasoning Test Battery (version 1) was introduced in South Africa in 1995, and used primarily within the financial sector. Particularly the verbal test in this battery had a very high level of difficulty, because it required respondents to differentiate between five degrees of truth instead of three, as is the case with the Critical Reasoning Test Battery version 2. Version 2 of the battery was introduced in 1999, with standardisation and validation studies that are reported in this manual. Because version 2 of the battery had higher reliabilities in South Africa, it is recommended that users use this version rather than the original version in future.

The effect of affirmative action recruitment and selection practices on test statistics

Many employers in South Africa are adopting affirmative action recruitment and selection practices. Because most of the data available to Psytech SA come from recruitment projects, this has an effect on the reported test statistics.

A very common strategy when recruiting candidates for affirmative action positions, is as follows:

- Seriously consider every applicant from a formerly disadvantaged background who may possibly meet the requirements of the position.
- Only consider applicants from formerly advantaged backgrounds once a quota of formerly disadvantaged individuals has been met, or when the supply of suitable disadvantaged applicants has been exhausted.

Assessing candidates with psychometric tests incurs a cost for the employer, and employers usually try to minimise costs. Thus testing occurs fairly late in the selection process. Frequently candidates are evaluated on application

forms, CVs and interviews before they are tested. Often this means that the candidates from formerly advantaged backgrounds, who are tested, have been more rigorously pre-screened than the candidates from formerly disadvantaged backgrounds. This serves to aggravate the reported group differences on the tests, and can make a test appear more biased than it otherwise would be.

Users are advised to bear this in mind when evaluating the reported figures in this manual. Test users are also welcome to approach Psytech SA when large recruitment projects are being undertaken, so that the project can be planned in such a way as to render less distorted information about the tests. If necessary and justifiable in the interest of research, Psytech SA is willing to subsidise such projects.

Some cautionary notes:

- No subtest of the CRTB2 should be used on its own as a selection instrument. The tests should always form part of an assessment battery that includes other measures, and preferably some non-test information as well.
- It is strongly recommended that a validation/integration interview should follow any assessment by means of tests or questionnaires. The interviewer should use this opportunity to put the test results into perspective relative to the respondent's background and the purpose of the assessment.
- Users should pay attention to the reliability and validity data available relating to the population group on which they intend to use the questionnaire.
- Users should use norm groups that are appropriate for the test person being assessed, also bearing in mind the demands of the situation for which the person is being assessed.
- Bearing in mind that the CRTB2 tests are all very short, users should bear in mind that they are not in-depth measures, and they should therefore not be interpreted in isolation.

Computer-assisted reports

Psytech tests and questionnaires are all supported by computer-assisted reports. Some of the tests have a range of computer-assisted reports, allowing instant interpretation of the test results from a variety of perspectives. For the CRTB2, a standard report and a feedback report are available, either as a battery or individually for each subtest. In addition, a results summary spreadsheet is available to generate which is particularly useful as a summarised version of the individual candidates scores, or scores of a group of candidates that have completed the CRTB2. Computerised reports can also be created for specific batteries of measures, integrating the results of ability tests with personality and perhaps interests.

How do the computer-generated reports work?

The reports represent an expert system, drawing on numerous built-in relationships between patterns of scores and human behaviour. It would normally take a user many years of experience to gain the knowledge and insight that are contained in this reporting system.

What are the advantages of computer-generated reports?

Computer-generated reports ensure that the complete pattern of scores is interpreted every time. No score or combination of scores is overlooked. Everyone is treated in exactly the same way, irrespective of whether the person interpreting the results is having an 'off day' or is pressed for time. This helps to ensure fairness and consistency. Moreover, computer-generated reports save a lot of time, freeing the professional up to add value in the interview, integration of results from other sources and feedback processes.

Are computer-assisted reports open to abuse?

Like any powerful tool, computer-assisted reports can be misused. They should not be used to substitute for professional expertise, but rather to supplement and support it.

One must remember that these reports are generic-the standard reports do not know anything about the requirements of the positions that the respondent may have applied for. They are also completely unaware of the respondent's background and personal circumstances. They can usually not stand on their own, but must be used as one source of information in the assessment process, and be integrated with other information. This integration and interpretation is highly skilled professional work, and it should not be left to persons who have not had the required training.

In some situations, handing out unaltered computer-generated reports to respondents or line managers without any counselling or explanation, could be considered abuse of these reports. We recommend that the technical appendix in a report, which gives a graphic summary of raw scores and profiles, not be given to untrained persons.

What about competency-based reports?

You need not be limited to the reports supplied with the GeneSys online platform. Special reports can be written for clients based on their own competency models, or based on the results of validation studies. Psytech SA undertakes to do these as consulting projects, and the cost is dependent on the length and complexity of the report that the client requires.

Instructions for administering tests on computer

Both subtests in the Critical Reasoning Test Battery can be administered either on the computer, via the GeneSys online platform, or with paper and pencil.

For instructions on how to operate the platform for test administration, please refer to the GeneSys Online platform, under tutorials via <https://eu.genesysonline.net/>. There are videos and downloadable PDFs. Special training in the use of the software is available, which is strongly recommend. Do not attempt to use computer software for test administration if you are not completely comfortable with how the online platform works. Familiarise yourself with the process of setting up a testing session with the software, creating the data record and entering the respondent's biographical information into the system, or assisting the respondent in doing so themselves.

Make sure that the respondent is physically able to operate the keyboard and the mouse, and can see the screen clearly.

Welcome the respondents (you may use a standard introduction), set them at ease and ensure that every respondent has given informed consent for the assessment.

Provide respondents who are completing tests on computer, with blank notepaper and a pencil, in case they want to make a note of an item they might want to revise when they reach the end of the test. Respondents may also make some rough calculations during the test.

Stay with the respondents while they start the test, and read through the instructions with them. If the respondents have any questions about the operation of the computer, or the example questions, answer those.

Once the respondent has completed the instruction section and started on the actual test items, do not provide any further help with the items, although you can assist if there are any actual computer problems (such as the mouse or the keyboard not responding correctly). Do not allow respondents to talk among themselves during testing.

Do not leave respondents to complete a battery of tests unsupervised. Remain in the room, and when the respondent reaches the end of the first test, provide support for the subsequent tests by reading through the instructions with them again.

At the end of the test battery, a screen will appear telling the respondent to call the test administrator. At this stage you need to enter the PIN you have chosen (when opening an account with Psytech SA) to exit the test administration program and save the responses. Do not allow the respondents to do this themselves.

Critical Reasoning Test Battery: Pencil and Paper Administration Instructions

Comprehensive, step by step instructions for the pencil and paper administration of the CRTB2 are found as an appendix in the technical manual for that test, published by Psytech International and distributed free of charge in electronic form on the GeneSys online platform. Pencil and paper users can download the technical manual from the Psytech website at no charge.

Users are urged to follow the prescribed instructions when administering the test battery.

Critical Reasoning Test Battery (CRTB2)

Reliability introduction

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Reliability studies

Reliability studies are done whenever we receive a substantial body of data that contains item responses. Reliability calculation is one of the services offered by Psytech SA to its clients. In almost all cases, clients have been willing to share the results of these calculations with other users.

Availability of biographical information

Frequently full biographical information is not collected, which makes it very difficult to calculate separate reliabilities on different racial and language groups. In some cases, it has been necessary to do a post-hoc classification of respondents based on their names. In such situations it is usually not possible to distinguish between Whites and Coloureds, and they have had to be classified together in one group.

Relationship between reliability groups and norm groups

It is not possible to create a norm group for each reliability sample, because of sample size constraints. It is also not possible to report Coefficient Alpha for every norm sample, because item response data are not always available. In some cases, we have used the Kuder-Richardson Formula 21 to calculate an index of reliability in the absence of detailed item response information. For ease of reference, we have included as much information as possible about the composition of the samples, rather than refer the user to the description of a related norm group.

Standard error of measurement (SEM)

Where data are available, the standard error of measurement is reported for every group for which we have calculated reliabilities. This is usually done for samples that are also used as norm groups. In some cases, the standard error of measurement is reported for a group that has been screened for English comprehension, and for the total group as well.

Choosing an appropriate comparison group for reliability

If a larger, more diverse group is available that conforms to the demographic characteristics of the group you are interested in, use that table for comparison purposes.

The effect of reliability on validity

The reliability of a test places an upper limit on its validity. If a test is not reliable, it can not be valid.

What Does It Mean If A Test Has Low Reliability?

On an ability measure, Reliability is considered low if it is below 0.75. In cases where the reliability is below 0.65, the results should be interpreted with extreme caution by using additional information for this purpose. The interview prompts report can assist the user in obtaining additional information for the purpose of triangulation, directly from the respondent. There are various reasons why the reliability of a test, or of a specific sample of the overall sample group, might be low:

- Respondents guessing the answers to items which they may not know. Results should therefore be interpreted with caution.

- Respondents may have rushed to complete the assessment or may have been lacking in motivation at the time of test completion. In this instance, a lower reliability could be attributed to guessing or hasty decision making.
- Respondents finding the test items too difficult.
- Shorter tests, although economic and quick to administer, tend to be less reliable.

It is best practice to always rely on multiple sources of information when making an informed decision utilising an assessment process. This is of particular importance when the reliability of an assessment is lower than usual.

Advice to users

- Collect full biographical information on the respondents.
- Verify whether the scales you are interested in for decision-making purposes, are reliable for the persons you want to test.
- Where available, bear the Standard Error of Measurement in mind when making decisions on test results.
- Do not use unreliable scales for decision making.
- Do not rely on a single test when reliability is doubtful.

List of South African reliability studies for the Critical Reasoning Test Battery

Description	Study number
SA Business school applicants	R1
SA General population	R2
SA Insurance sales agents	R3
SA Managers and graduates	R4
SA General Population 2002-2006	R5
SA General Population updated 2010	R6
SA African updated 2010	R7
SA Coloured updated 2010	R8
SA Asian updated 2010	R9
SA European updated 2010	R10
SA Indigenous updated 2010	R11
SA English updated 2010	R12
SA Afrikaans updated 2010	R13

Index of reliability studies done on the Critical Reasoning Test Battery (CRTB2)

Description	Study number
SA Business school applicants	R1
SA General population	R2
SA Insurance sales agents	R3
SA Managers and graduates	R4
SA General Population 2002-2006	R5
SA General Population updated 2010	R6
SA African updated 2010	R7
SA Coloured updated 2010	R8
SA Asian updated 2010	R9
SA European updated 2010	R10
SA Indigenous updated 2010	R11
SA English updated 2010	R12
SA Afrikaans updated 2010	R13
SA Aggregate population 2016	R14
SA Afrikaans 2016	R15
SA English 2016	R16
SA isiXhosa 2016	R17
SA isiZulu 2016	R18
SA Setswana 2016	R19
SA Sesotho 2016	R20
SA Indigenous 2016	R21

CRTB2 Reliability: SA Business School Applicants

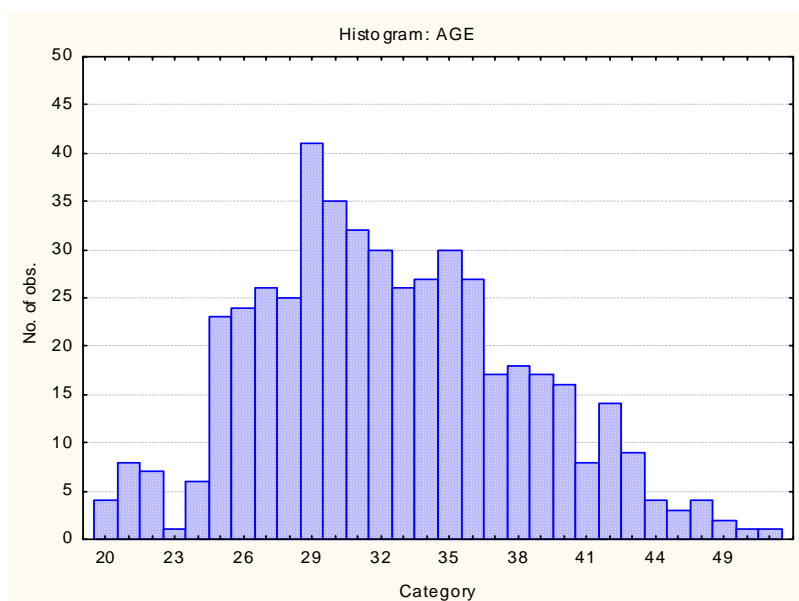
Applicants to a business school in Gauteng, applying for admission to either the Masters of Business Administration degree or the Postgraduate Diploma in Business Administration. Data were collected during the period 2000-2002.

Sample composition

Frequency table: RACE				
Category	Count	Cumulative Count	Percent	Cumulative Percent
Black	174	174	35.22267	35.2227
White	236	410	47.77328	82.9960
Asian	34	444	6.88259	89.8785
Coloured	12	456	2.42915	92.3077
Missing	38	494	7.69231	100.0000

Frequency table: GENDER				
Category	Count	Cumulative Count	Percent	Cumulative Percent
Female	149	149	30.16194	30.1619
Male	338	487	68.42105	98.5830
Undisclosed	1	488	0.20243	98.7854
Missing	6	494	1.21457	100.0000

Descriptive Statistics						
Variable	Mean	Std.Dev	Minimum	Maximum	N	No. cases Missing
AGE	32.55144	6.470267	20.00000	99.00000	486	8



Category	Frequency table: LANGUAGE			
	Count	Cumulative Count	Percent	Cumulative Percent
eng	213	213	43.11741	43.1174
afr	74	287	14.97976	58.0972
shona	6	293	1.21457	59.3117
sesotho	5	298	1.01215	60.3239
zulu	35	333	7.08502	67.4089
danish	2	335	0.40486	67.8138
xhosa	22	357	4.45344	72.2672
tsonga	6	363	1.21457	73.4818
nsotho	20	383	4.04858	77.5304
ssotho	16	399	3.23887	80.7692
kikuyu	1	400	0.20243	80.9717
italian/: italian/eng	1	401	0.20243	81.1741
sotho	7	408	1.41700	82.5911
tswana	26	434	5.26316	87.8543
venda	2	436	0.40486	88.2591
sepedi	1	437	0.20243	88.4615
kiswahil: kiswahili	1	438	0.20243	88.6640
siswati	4	442	0.80972	89.4737
telagu	1	443	0.20243	89.6761
Error	1	444	0.20243	89.8785
portuguese	1	445	0.20243	90.0810
swati	1	446	0.20243	90.2834
swazi	2	448	0.40486	90.6883
ndebele	1	449	0.20243	90.8907
russian	2	451	0.40486	91.2955
yoruba	1	452	0.20243	91.4980
tshivenda	1	453	0.20243	91.7004
bemba	1	454	0.20243	91.9028
german	1	455	0.20243	92.1053
Missing	39	494	7.89474	100.0000

Internal Consistency reliabilities on CRTB2 subtests

Subtest	Cronbach Alpha Coefficient
Verbal Critical Reasoning	.84
Numerical Critical Reasoning	.79

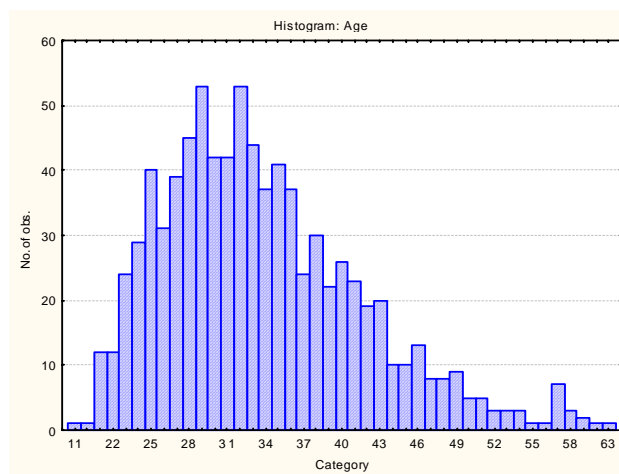
CRTB2 Reliability: SA General Population

Calculated from data submitted by various clients of Psytech SA. Data collected between 2000 and 2002. It should be borne in mind that the CRTB2 is only recommended for persons at managerial-graduate level, therefore this should not be considered a true population sample, rather a combination of various samples that were available.

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
Whites/coloureds	590	590	68.84481	68.8448
Asians	56	646	6.53442	75.3792
Blacks	208	854	24.27071	99.6499
Missing	3	857	0.35006	100.0000

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
Female	232	232	27.07118	27.0712
Male	620	852	72.34539	99.4166
Unknown	5	857	0.58343	100.0000
Missing	0	857	0.00000	100.0000

Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	33.70476	7.895381	11.00000	63.00000	840	17



Internal consistency reliabilities on CRTB2 subtests

Subtest	Kuder-Richardson Formula 21
Numerical Critical Reasoning	.88
Verbal Critical Reasoning	.82

Standard error of measurement

	1 ScaleName	2 SEM	3 SD	4 Reliability
1	Numerical Critical Reasoning	2.082438	6.011480	0.88
2	Verbal Critical Reasoning	3.022836	7.124892	0.82

CRTB2 Reliability: SA Insurance sales

Sample composition

Insurance sales consultants employed in a major South African insurance company, tested as part of a validation exercise.

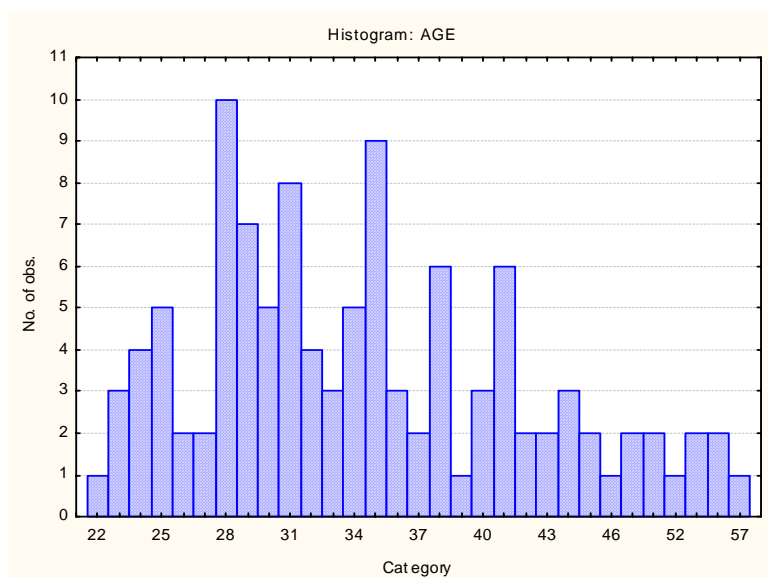
Respondents had a minimum education of grade 12, and also had special training specific to the insurance industry.

Data were collected in 2001-2002.

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
Whites/coloureds	85	85	77.27273	77.2727
Asians	7	92	6.36364	83.6364
Blacks	18	110	16.36364	100.0000
Missing	0	110	0.00000	100.0000

Category	Frequency table: GENDER			
	Count	Cumulative Count	Percent	Cumulative Percent
Female	18	18	16.36364	16.3636
Male	91	109	82.72727	99.0909
Unknown	1	110	0.90909	100.0000
Missing	0	110	0.00000	100.0000

Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
AGE	34.74312	8.135887	22.00000	57.00000	109	1



Internal consistency reliabilities on CRTB2 subtests

Subtests	Coefficient alpha
Verbal Critical Reasoning VCR2	.883658
Numerical Critical Reasoning NCR2	.834950
Mean alpha	0.859304

Standard error of measurement

	1	2	3	4
	ScaleName	SEM	SD	Reliability
1	Numerical Critical Reasoning	2.020322	4.900000	0.83
2	Verbal Critical Reasoning	2.459512	7.100000	0.88

CRTB2 reliability: SA managers and graduates

Sample composition:

Clients tested by Psytech SA and its clients for managerial positions that require a tertiary qualification.

N = 121

Internal consistency reliabilities on CRTB2 subtests

Subtest	Kuder-Richardson Formula 21
Numerical Critical Reasoning	.75
Verbal Critical Reasoning	.80

SA General Population 2002 to 2006

Sample composition

Respondents tested by Psytech SA and its clients between the period 1 January 2002 to July 2006. Norms were recalculated on updated data, discarding older data from the period when the test may not have been used appropriately.

For Numerical Critical Reasoning

Age			
Mean	Min	Max	Missing
30.01	19	57	67

Sex		
Male	Female	Missing
508	206	9

Education		
Grade 10 or 11	2	
Grade 12	97	
University entrance matric	0	
Vocational Training	47	
Technikon	28	
University diploma	51	
Degree	199	
Post Graduate	110	
Missing	155	

First Language		
isiZulu	38	
isiXhosa	31	
Afrikaans	104	
Sepedi	11	
English	256	
Setswana	24	
Sesotho	32	
Xitsonga	6	
siSwati	4	
isiNdebele	2	
Tshivenda	8	
Other	30	
Missing	157	

Race		
Asian	109	
African	215	
Coloured	34	
European	231	
Other	2	
Missing	130	

For Verbal Critical Reasoning

Age			
Mean	Min	Max	Missing
30.14	19	57	69

Sex		
Male	Female	Missing
513	203	9

Education		
Grade 10 or 11	3	
Grade 12	88	
University entrance matric	0	
Vocational Training	47	
Technikon	31	
University diploma	52	
Degree	201	
Post Graduate	112	
Missing	157	

First Language		
isiZulu	37	
isiXhosa	30	
Afrikaans	109	
Sepedi	11	
English	255	
Setswana	21	
Sesotho	32	
Xitsonga	6	
siSwati	4	
isiNdebele	2	
Tshivenda	8	
Other	31	
Missing	159	

Race		
Asian	108	
African	212	
Coloured	33	
European	236	
Other	2	
Missing	132	

Internal consistency reliabilities for CRTB2 subtests

Subtest	Reliability (Cronbach coefficient alpha)	Mean item-test correlation
Numerical Critical Reasoning	.83	.36
Verbal Critical Reasoning	.86	.34

Standard error of measurement

Subtest	Standard Error of Measurement
Numerical Critical Reasoning	2.088
Verbal Critical Reasoning	2.71

Critical Reasoning Test Battery Reliability: South African general population, updated 2010

Sample composition

The sample consisted of South Africans tested by Psytech South Africa and collaborators in the period leading up to January 2010. Not all respondents completed both subtests of the Critical Reasoning Test Battery, therefore the biographical particulars are reported separately for the Numerical Critical Reasoning Test and the Verbal Critical Reasoning Test respectively.

Sample composition: Numerical Critical Reasoning Test

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	3038	3038	64.46000	64.4600
F	1654	4692	35.09442	99.5544
U	21	4713	0.44558	100.0000
Missing	0	4713	0.00000	100.0000

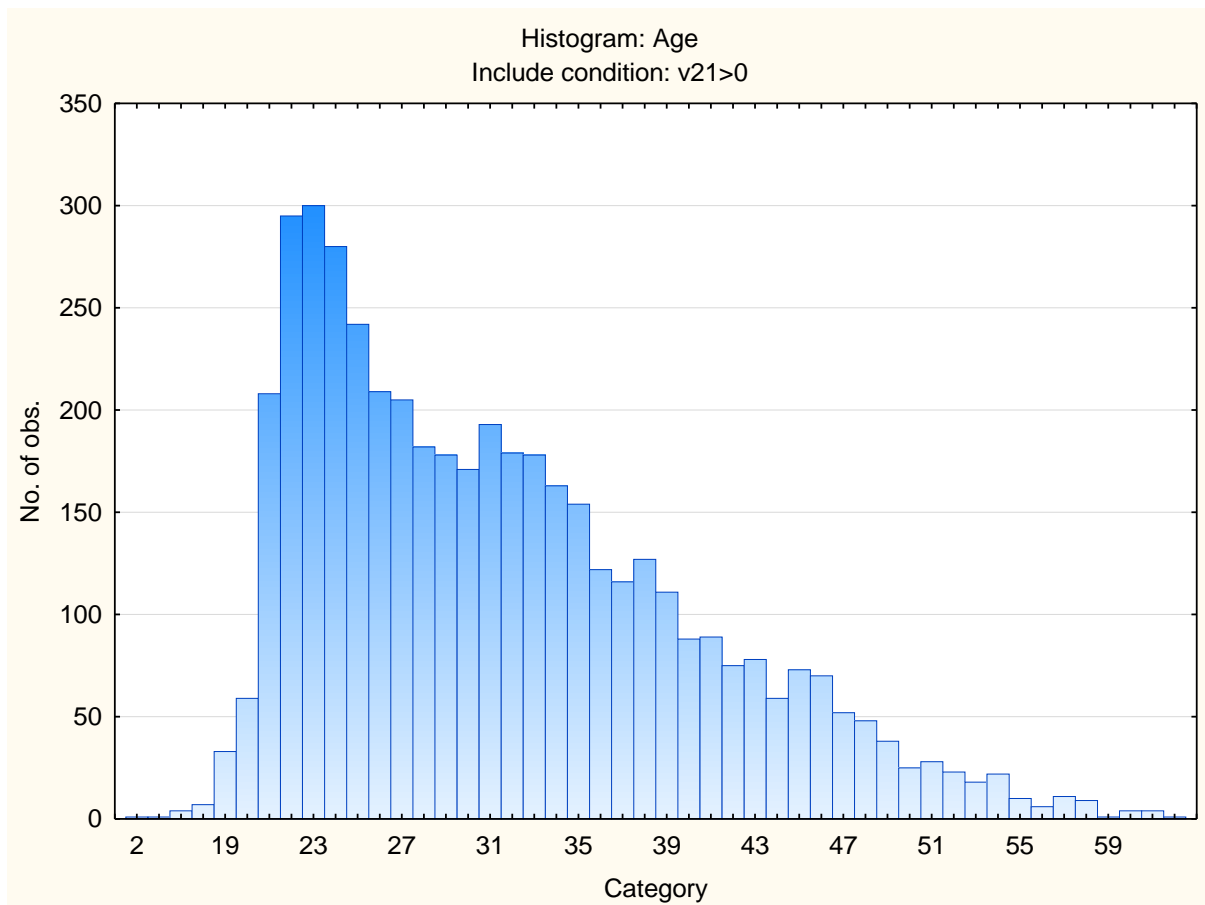
Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	535	535	11.35158	11.3516
Diploma	779	1314	16.52875	27.8803
Grade 12	450	1764	9.54806	37.4284
Degree	818	2582	17.35625	54.7846
<Grade 12	25	2607	0.53045	55.3151
Vocational Training	64	2671	1.35795	56.6730
Missing	2042	4713	43.32697	100.0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
English	1147	1147	24.33694	24.3369
Setswana	144	1291	3.05538	27.3923
Afrikaans	463	1754	9.82389	37.2162
isiZulu	364	2118	7.72332	44.9395
Xitsonga	44	2162	0.93359	45.8731
isiXhosa	278	2440	5.89858	51.7717
Sepedi	77	2517	1.63378	53.4055
Tshivenda	45	2562	0.95481	54.3603
isiNdebele	11	2573	0.23340	54.5937
siSwati	19	2592	0.40314	54.9968
Sesotho	179	2771	3.79801	58.7948
Missing	1942	4713	41.20518	100.0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
English	1147	1147	24.33694	24.3369
Indigenous	1161	2308	24.63399	48.9709
Afrikaans	463	2771	9.82389	58.7948
Missing	1942	4713	41.20518	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Asian	446	446	9.46319	9.4632
European	1016	1462	21.55739	31.0206
African	1336	2798	28.34712	59.3677
Coloured	135	2933	2.86442	62.2321
Missing	1780	4713	37.76788	100.0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	31.49451	8.591961	2.000000	63.00000	4550	163



Sample composition: Verbal Critical Reasoning test

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	3164	3164	64.63739	64.6374
F	1707	4871	34.87232	99.5097
U	24	4895	0.49030	100.0000
Missing	0	4895	0.00000	100.0000

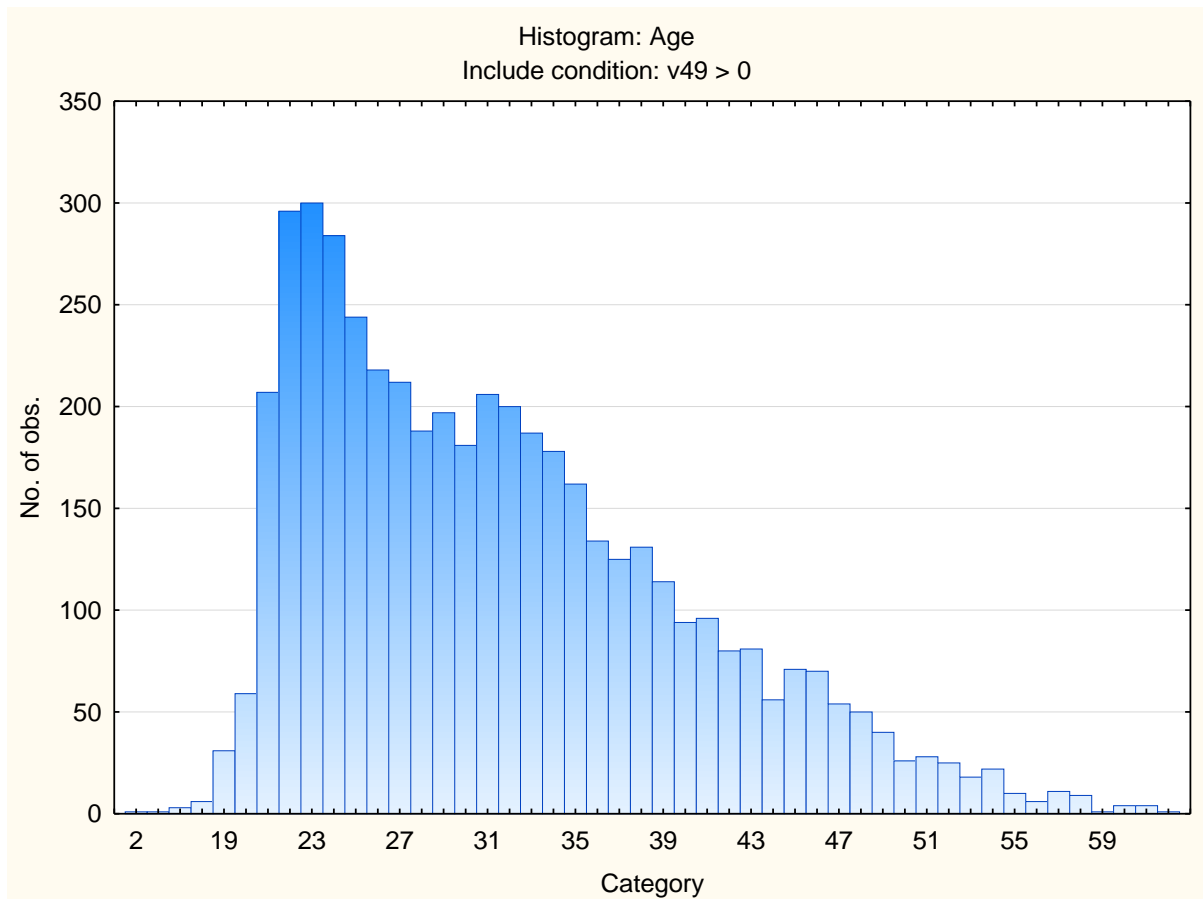
Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	577	577	11.78754	11.7875
Diploma	783	1360	15.99591	27.7835
Grade 12	444	1804	9.07048	36.8539
Degree	857	2661	17.50766	54.3616
<Grade 12	24	2685	0.49030	54.8519
Vocational Training	63	2748	1.28703	56.1389
Missing	2147	4895	43.86108	100.0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
English	1173	1173	23.96323	23.9632
Setswana	146	1319	2.98264	26.9459
Afrikaans	494	1813	10.09193	37.0378
isiZulu	357	2170	7.29316	44.3309
Xitsonga	43	2213	0.87845	45.2094
isiXhosa	277	2490	5.65884	50.8682
Sepedi	79	2569	1.61389	52.4821
Tshivenda	47	2616	0.96016	53.4423
isiNdebele	10	2626	0.20429	53.6466
siSwati	20	2646	0.40858	54.0552
Sesotho	178	2824	3.63636	57.6915
Missing	2071	4895	42.30848	100.0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
English	1173	1173	23.96323	23.9632
Indigenous	1157	2330	23.63636	47.5996
Afrikaans	494	2824	10.09193	57.6915
Missing	2071	4895	42.30848	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Asian	453	453	9.25434	9.2543
European	1065	1518	21.75689	31.0112
African	1338	2856	27.33401	58.3453
Coloured	136	2992	2.77835	61.1236
Missing	1903	4895	38.87640	100.0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	31.57518	8.499795	2.000000	63.000000	4722	173



Internal consistency Reliabilities: Cronbach Coefficient Alpha

	Cronbach Coefficient Alpha
Numerical Critical Reasoning Test	.81
Verbal Critical Reasoning Test	.86

Critical Reasoning Test Battery Reliability: South Africans of African race, updated 2010.

Sample composition

The sample consisted of South Africans of African race, tested by Psytech South Africa and collaborators during the period leading up to January 2010. Because not all respondents completed both the Verbal and Numerical Critical Reasoning Tests, the statistics are reported separately for the two tests.

Sample composition: Numerical Critical Reasoning Test

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	809	809	60.55389	60.5539
F	524	1333	39.22156	99.7754
U	3	1336	0.22455	100.0000
Missing	0	1336	0.00000	100.0000

Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	214	214	16.01796	16.0180
Diploma	471	685	35.25449	51.2725
Grade 12	101	786	7.55988	58.8323
Degree	382	1168	28.59281	87.4251
<Grade 12	4	1172	0.29940	87.7246
Vocational Training	21	1193	1.57186	89.2964
Missing	143	1336	10.70359	100.0000

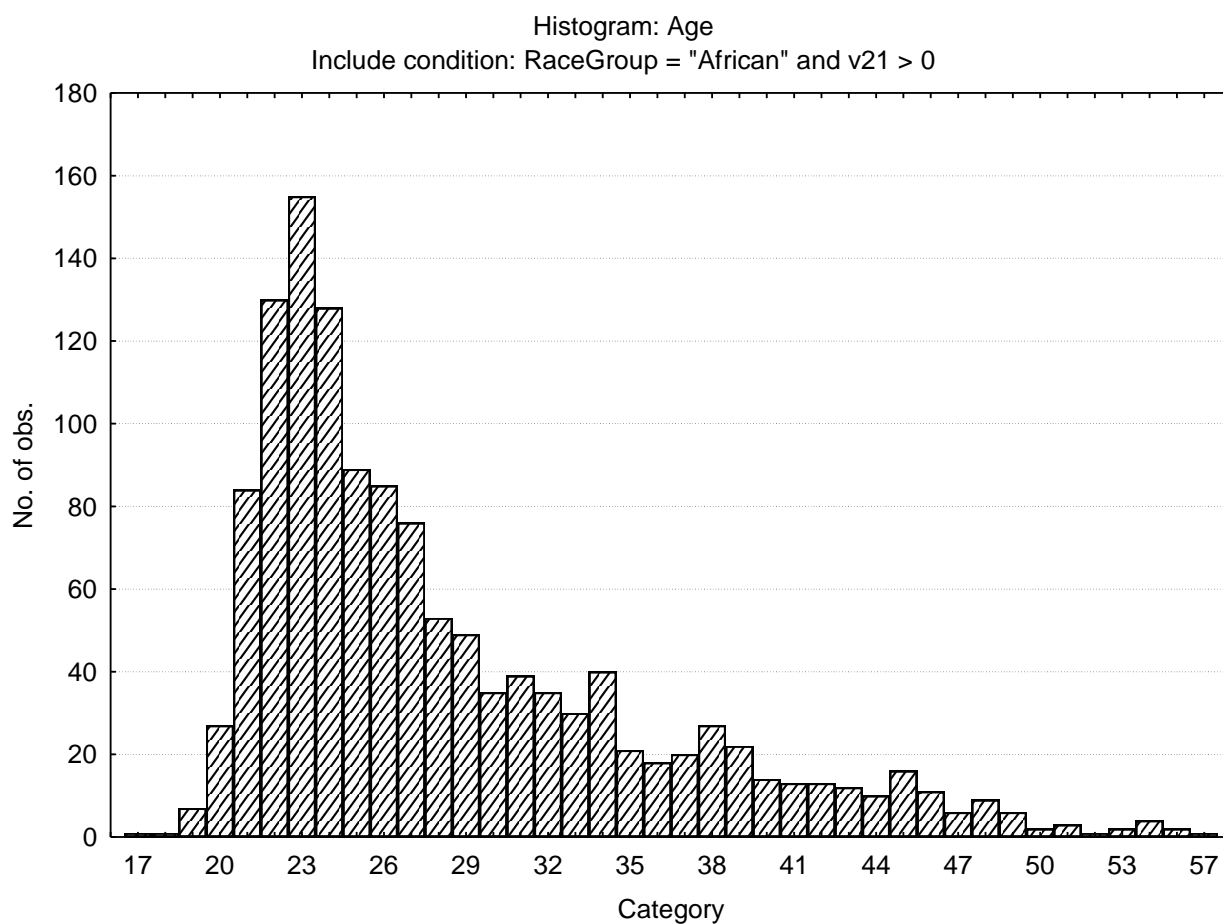
Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
English	56	56	4.19162	4.1916
Setswana	144	200	10.77844	14.9701
Afrikaans	5	205	0.37425	15.3443
isiZulu	359	564	26.87126	42.2156
Xitsonga	44	608	3.29341	45.5090
isiXhosa	272	880	20.35928	65.8683
Sepedi	74	954	5.53892	71.4072
Tshivenda	45	999	3.36826	74.7754

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
isiNdebele	11	1010	0.82335	75.5988
siSwati	18	1028	1.34731	76.9461
Sesotho	179	1207	13.39820	90.3443
Missing	129	1336	9.65569	100.0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
English	56	56	4.19162	4.1916
Indigenous	1146	1202	85.77844	89.9701
Afrikaans	5	1207	0.37425	90.3443
Missing	129	1336	9.65569	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
African	1336	1336	100.0000	100.0000
Missing	0	1336	0.0000	100.0000

Variable	Descriptive Statistics: Age					N	No.cases Missing
	Mean	Std.Dev	Minimum	Maximum			
Age	28.31149	7.285204	17.00000	57.00000		1297	39



Sample composition: Verbal Critical Reasoning Test

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	811	811	60.61286	60.6129
F	524	1335	39.16293	99.7758
U	3	1338	0.22422	100.0000
Missing	0	1338	0.00000	100.0000

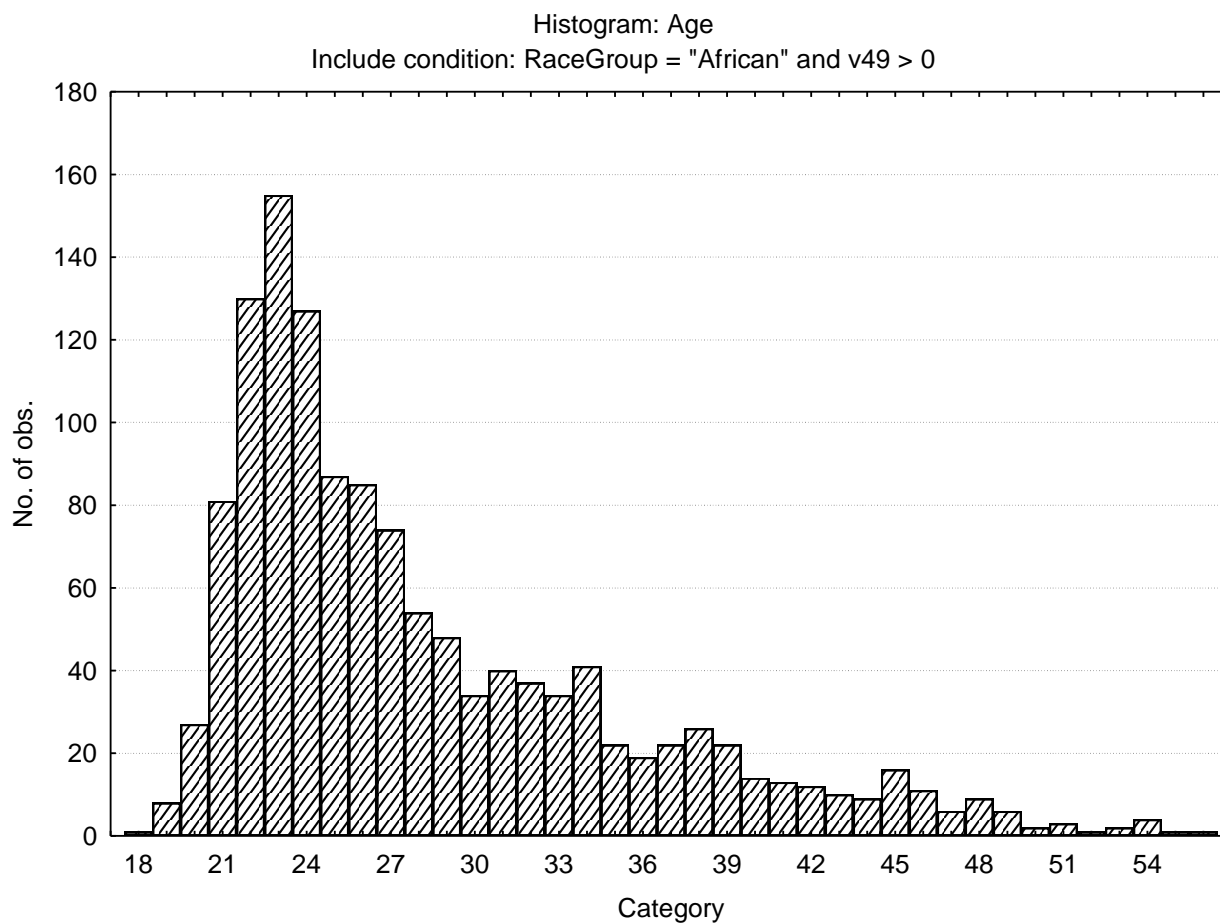
Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	228	228	17.04036	17.0404
Diploma	464	692	34.67862	51.7190
Grade 12	97	789	7.24963	58.9686
Degree	392	1181	29.29746	88.2661
<Grade 12	3	1184	0.22422	88.4903
Vocational Training	18	1202	1.34529	89.8356
Missing	136	1338	10.16442	100.0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
English	57	57	4.26009	4.2601
Setswana	146	203	10.91181	15.1719
Afrikaans	7	210	0.52317	15.6951
isiZulu	353	563	26.38266	42.0777
Xitsonga	43	606	3.21375	45.2915
isiXhosa	270	876	20.17937	65.4709
Sepedi	76	952	5.68012	71.1510
Tshivenda	47	999	3.51271	74.6637
isiNdebele	10	1009	0.74738	75.4111
siSwati	19	1028	1.42003	76.8311
Sesotho	178	1206	13.30344	90.1345
Missing	132	1338	9.86547	100.0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
English	57	57	4.26009	4.2601
Indigenous	1142	1199	85.35127	89.6114
Afrikaans	7	1206	0.52317	90.1345
Missing	132	1338	9.86547	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
African	1338	1338	100.0000	100.0000
Missing	0	1338	0.0000	100.0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	28.31607	7.213125	18.00000	57.00000	1294	44



Internal Consistency Reliabilities for Critical Reasoning Test Battery Subtests

	Cronbach coefficient alpha
Numerical Critical Reasoning Test	.66
Verbal Critical Reasoning Test	.79

Critical Reasoning Test Battery Reliability: South Africans of Coloured race, updated 2010

Sample composition

The sample consisted of South Africans, who declared their race group as being Coloured, tested by Psytech SA and collaborators in the period leading up to January 2010. Not all respondents completed both the Verbal and Numerical Critical Reasoning Test, therefore the biographical details are reported separately for the persons who completed the Numerical and Verbal Critical Reasoning Tests respectively.

Sample composition: Numerical Critical Reasoning Test

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	91	91	67.40741	67.4074
F	43	134	31.85185	99.2593
U	1	135	0.74074	100.0000
Missing	0	135	0.00000	100.0000

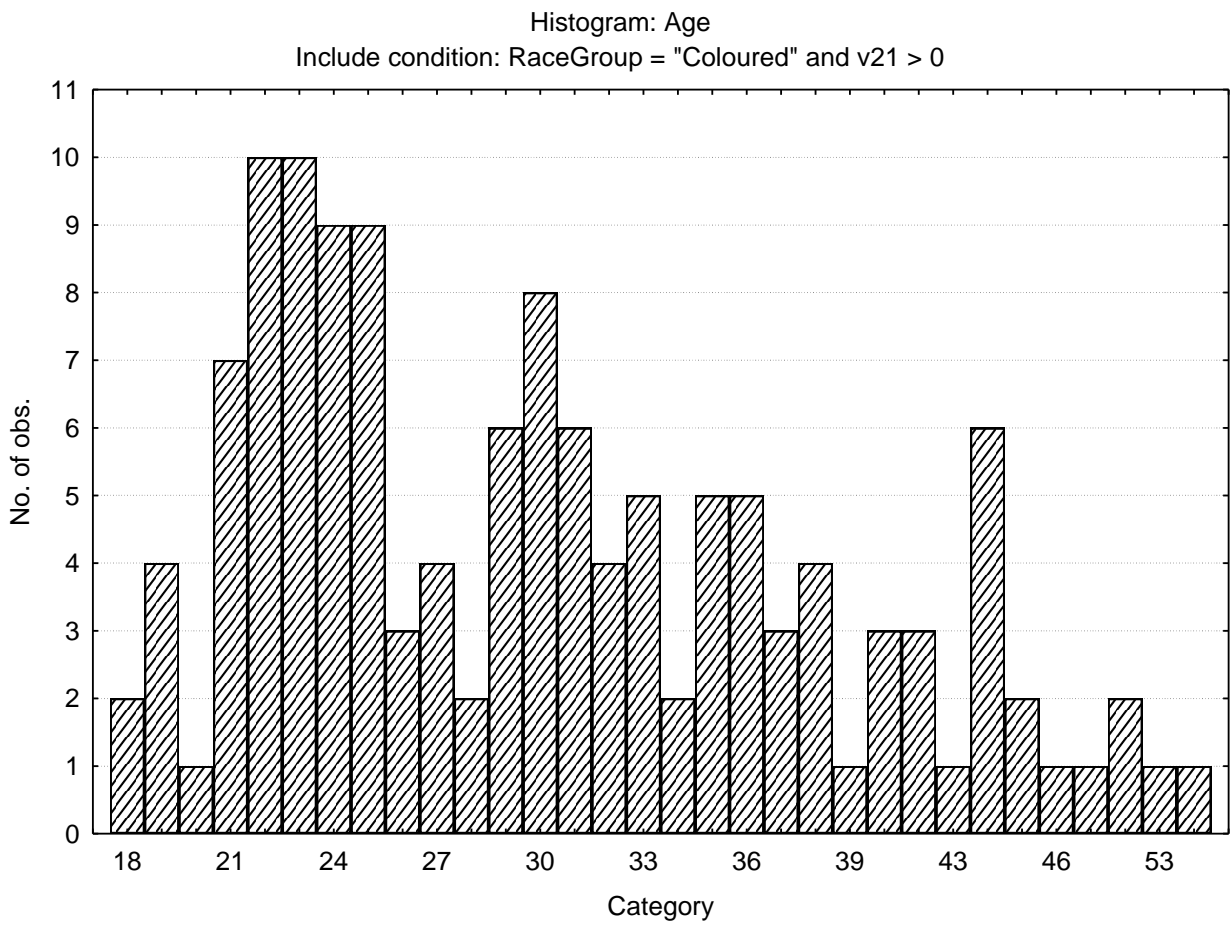
Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	16	16	11.85185	11.8519
Diploma	40	56	29.62963	41.4815
Grade 12	33	89	24.44444	65.9259
Degree	27	116	20.00000	85.9259
<Grade 12	1	117	0.74074	86.6667
Vocational Training	2	119	1.48148	88.1481
Missing	16	135	11.85185	100.0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
English	103	103	76.29630	76.2963
Afrikaans	26	129	19.25926	95.5556
Missing	6	135	4.44444	100.0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
English	103	103	76.29630	76.2963
Afrikaans	26	129	19.25926	95.5556
Missing	6	135	4.44444	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Coloured	135	135	100.0000	100.0000
Missing	0	135	0.0000	100.0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	30.29771	8.321145	18.00000	57.00000	131	4



Sample composition: Verbal Critical Reasoning Test

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	92	92	67.64706	67.6471
F	43	135	31.61765	99.2647
U	1	136	0.73529	100.0000
Missing	0	136	0.00000	100.0000

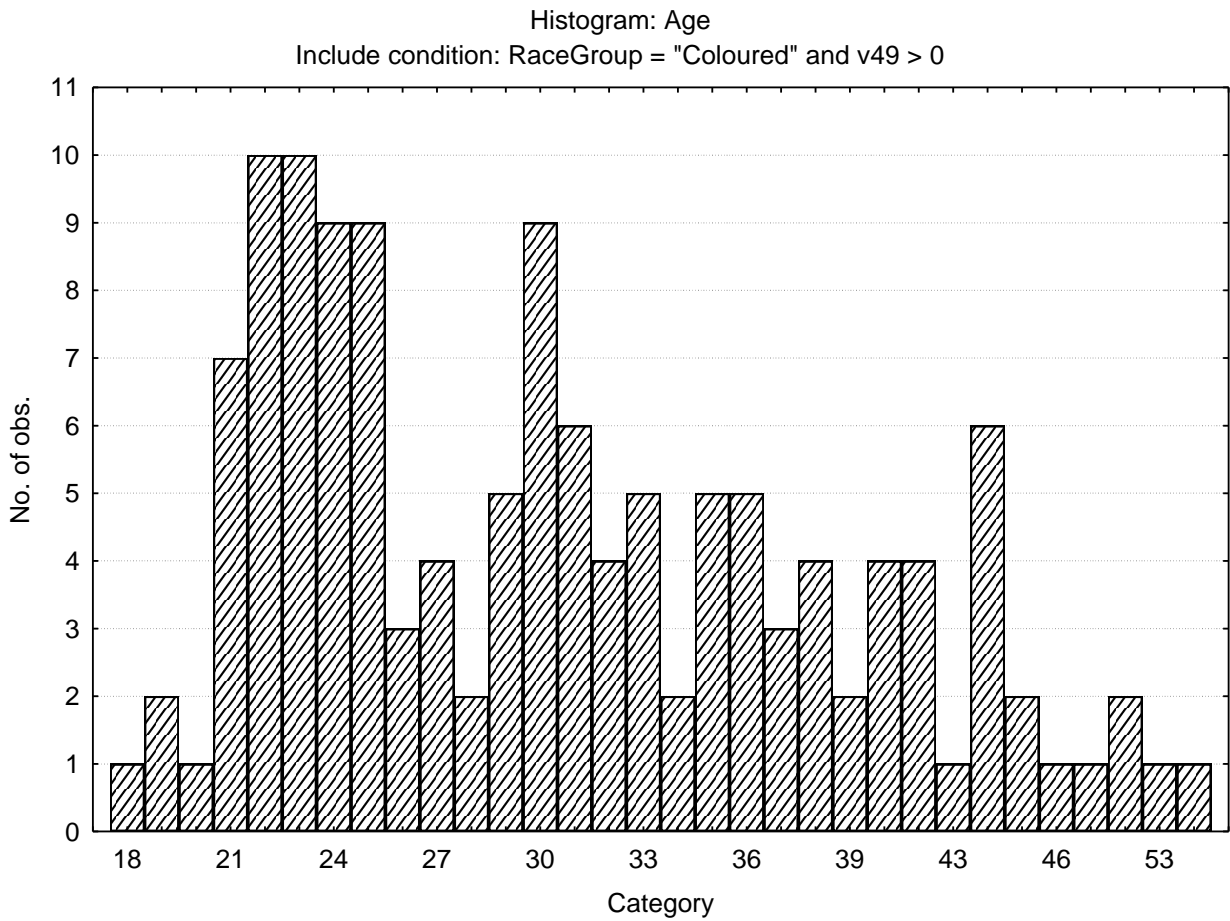
Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	16	16	11.76471	11.7647
Diploma	41	57	30.14706	41.9118
Grade 12	29	86	21.32353	63.2353
Degree	29	115	21.32353	84.5588
<Grade 12	2	117	1.47059	86.0294
Vocational Training	3	120	2.20588	88.2353
Missing	16	136	11.76471	100.0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
English	104	104	76.47059	76.4706
Afrikaans	25	129	18.38235	94.8529
isiXhosa	1	130	0.73529	95.5882
Missing	6	136	4.41176	100.0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
English	104	104	76.47059	76.4706
Indigenous	1	105	0.73529	77.2059
Afrikaans	25	130	18.38235	95.5882
Missing	6	136	4.41176	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Coloured	136	136	100.0000	100.0000
Missing	0	136	0.0000	100.0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	30.79389	8.248746	18.00000	57.00000	131	5



Internal Consistency Reliabilities for Critical Reasoning Test subtests

	Cronbach Coefficient Alpha
Numerical Critical Reasoning Test	.78
Verbal Critical Reasoning Test	.82

Critical Reasoning Test Battery

Reliability: South Africans of Asian race, updated 2010

Sample composition

The sample consisted of South Africans who described their race as Asian, tested by Psytech SA and collaborators in the period leading up to January 2010. Because not all respondents completed both subtests of the Critical Reasoning Test Battery, the biographical information is presented separately for the Numerical Critical Reasoning Test and the Verbal Critical Reasoning Test respectively.

Sample composition: Numerical Critical Reasoning Test

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	342	342	76.68161	76.6816
F	101	443	22.64574	99.3274
U	3	446	0.67265	100.0000
Missing	0	446	0.00000	100.0000

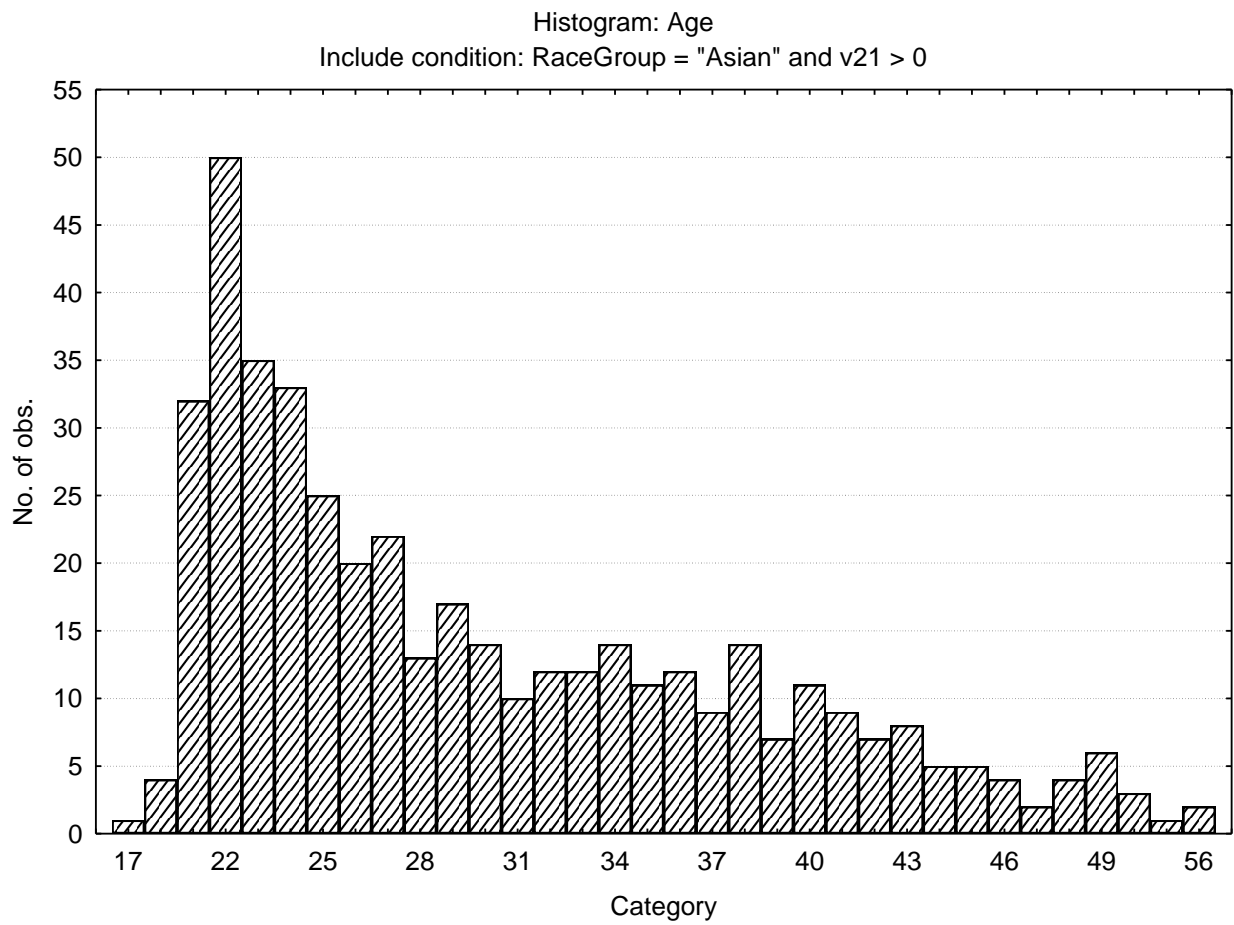
Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	93	93	20.85202	20.8520
Diploma	75	168	16.81614	37.6682
Grade 12	78	246	17.48879	55.1570
Degree	121	367	27.13004	82.2870
<Grade 12	4	371	0.89686	83.1839
Vocational Training	13	384	2.91480	86.0987
Missing	62	446	13.90135	100.0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
English	419	419	93.94619	93.9462
isiZulu	2	421	0.44843	94.3946
isiXhosa	2	423	0.44843	94.8430
Sepedi	2	425	0.44843	95.2915
Missing	21	446	4.70852	100.0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
English	419	419	93.94619	93.9462
Indigenous	6	425	1.34529	95.2915
Missing	21	446	4.70852	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Asian	446	446	100.0000	100.0000
Missing	0	446	0.0000	100.0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	29.89631	8.087046	17.00000	56.00000	434	12



Sample composition: Verbal Critical Reasoning Test Battery

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	349	349	77.04194	77.0419
F	101	450	22.29581	99.3377
U	3	453	0.66225	100.0000
Missing	0	453	0.00000	100.0000

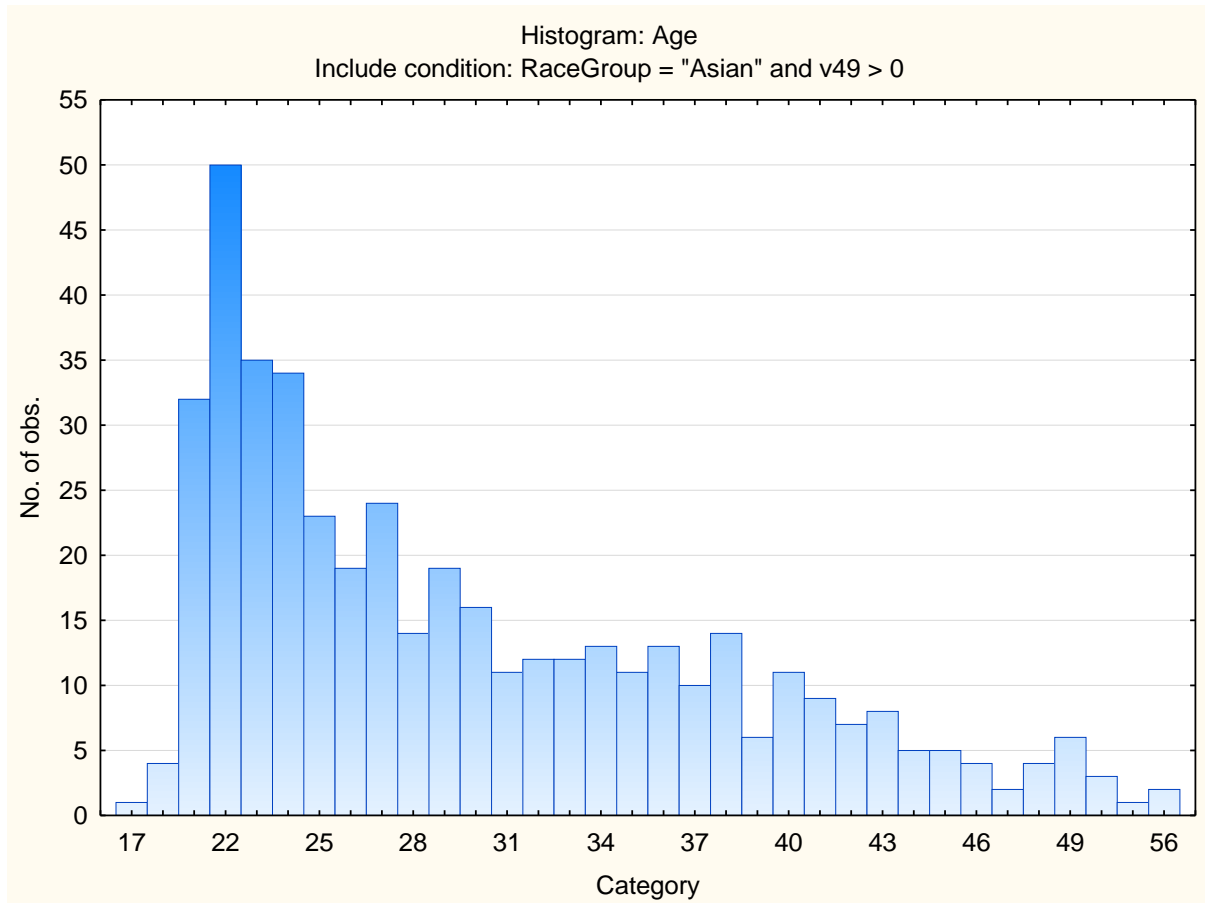
Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	100	100	22.07506	22.0751
Diploma	73	173	16.11479	38.1898
Grade 12	80	253	17.66004	55.8499
Degree	121	374	26.71082	82.5607
<Grade 12	4	378	0.88300	83.4437
Vocational Training	14	392	3.09051	86.5342
Missing	61	453	13.46578	100.0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
English	425	425	93.81898	93.8190
isiZulu	2	427	0.44150	94.2605
isiXhosa	2	429	0.44150	94.7020
Sepedi	2	431	0.44150	95.1435
Missing	22	453	4.85651	100.0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
English	425	425	93.81898	93.8190
Indigenous	6	431	1.32450	95.1435
Missing	22	453	4.85651	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Asian	453	453	100.0000	100.0000
Missing	0	453	0.0000	100.0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	29.89545	8.029160	17.00000	56.00000	440	13



Internal consistency reliability for Critical Reasoning Test Battery subtests

	Cronbach Coefficient Alpha
Numerical Critical Reasoning Test	.74
Verbal Critical Reasoning Test	.84

Critical Reasoning Test Battery Reliability: South Africans of European race, updated 2010

Sample composition

The sample consisted of South Africans who described their race as European, tested by Psytech South Africa and collaborators during the period leading up to January 2010. Not all respondents completed both subtests in the Critical Reasoning Test Battery, therefore biographical particulars are reported separately for the Numerical Critical Reasoning Test and the Verbal Critical Reasoning Test,

Sample composition: Numerical Critical Reasoning Test Battery

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	706	706	69.48819	69.4882
F	306	1012	30.11811	99.6063
U	4	1016	0.39370	100.0000
Missing	0	1016	0.00000	100.0000

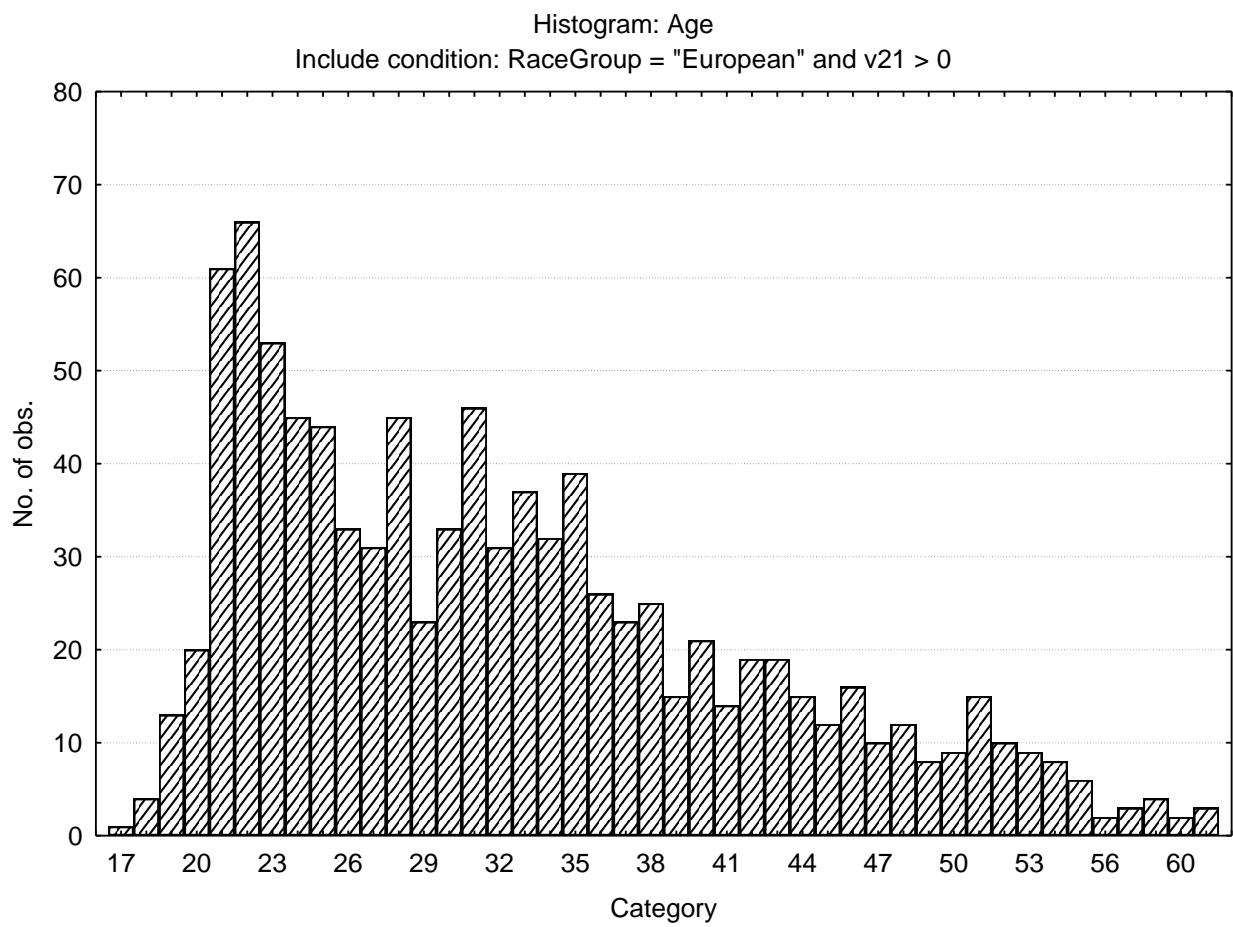
Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	176	176	17.32283	17.3228
Diploma	186	362	18.30709	35.6299
Grade 12	226	588	22.24409	57.8740
Degree	235	823	23.12992	81.0039
<Grade 12	15	838	1.47638	82.4803
Vocational Training	25	863	2.46063	84.9409
Missing	153	1016	15.05906	100.0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
English	553	553	54.42913	54.4291
Afrikaans	418	971	41.14173	95.5709
isiXhosa	2	973	0.19685	95.7677
Sepedi	1	974	0.09843	95.8661
siSwati	1	975	0.09843	95.9646
Missing	41	1016	4.03543	100.0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
English	553	553	54.42913	54.4291
Indigenous	4	557	0.39370	54.8228
Afrikaans	418	975	41.14173	95.9646
Missing	41	1016	4.03543	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
European	1016	1016	100.0000	100.0000
Missing	0	1016	0.0000	100.0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	32.28660	9.699588	17.00000	62.00000	963	53



Sample composition: Verbal Critical Reasoning Test

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	740	740	69.48357	69.4836
F	321	1061	30.14085	99.6244
U	4	1065	0.37559	100.0000
Missing	0	1065	0.00000	100.0000

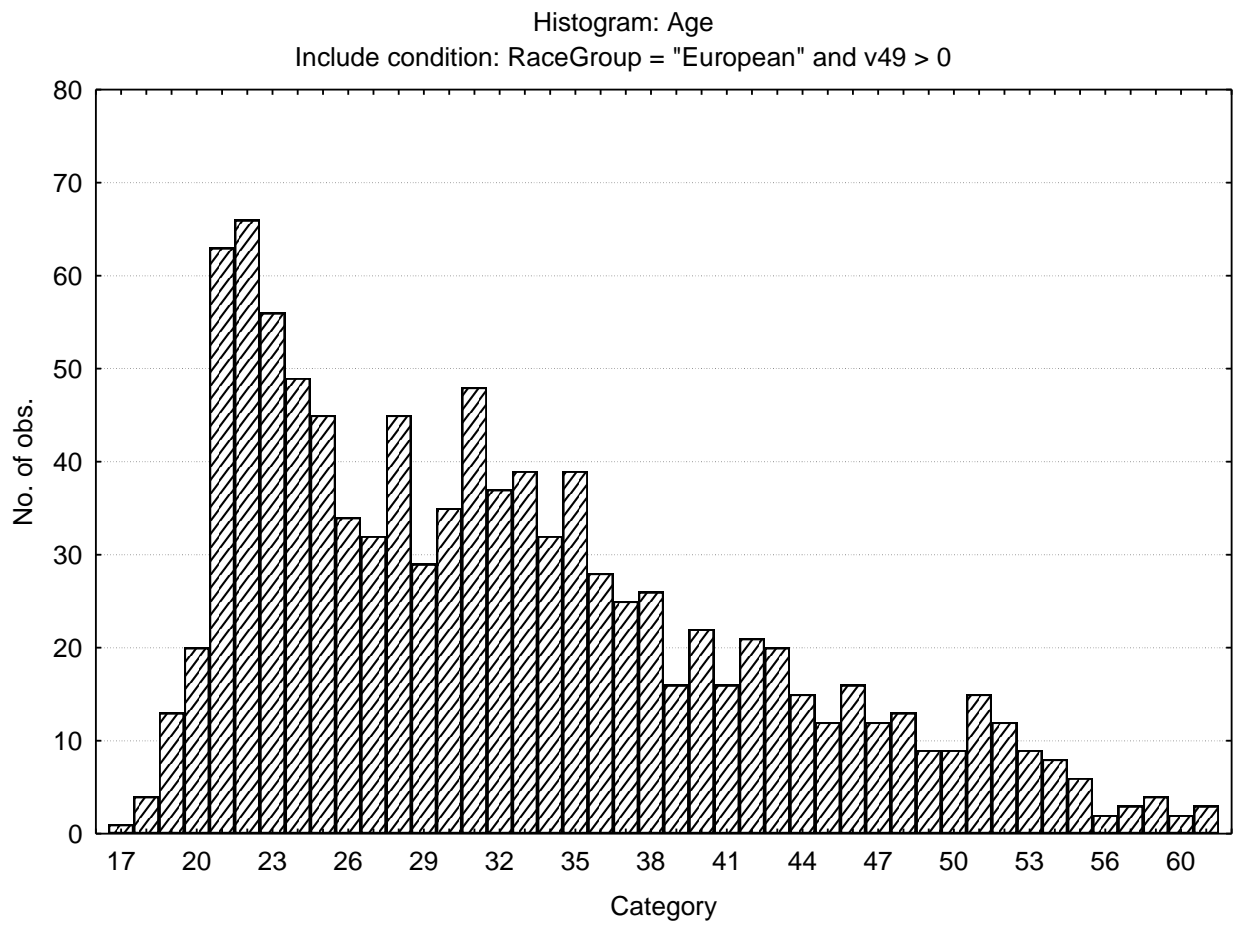
Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	197	197	18.49765	18.4977
Diploma	198	395	18.59155	37.0892
Grade 12	226	621	21.22066	58.3099
Degree	254	875	23.84977	82.1596
<Grade 12	14	889	1.31455	83.4742
Vocational Training	25	914	2.34742	85.8216
Missing	151	1065	14.17840	100.0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
English	571	571	53.61502	53.6150
Afrikaans	448	1019	42.06573	95.6808
isiXhosa	2	1021	0.18779	95.8685
Sepedi	1	1022	0.09390	95.9624
siSwati	1	1023	0.09390	96.0563
Missing	42	1065	3.94366	100.0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
English	571	571	53.61502	53.6150
Indigenous	4	575	0.37559	53.9906
Afrikaans	448	1023	42.06573	96.0563
Missing	42	1065	3.94366	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
European	1065	1065	100.0000	100.0000
Missing	0	1065	0.0000	100.0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	32.34224	9.641781	17.00000	62.00000	1011	54



Internal Consistency Reliability for Critical Reasoning Test Battery subtests

	Cronbach coefficient alpha
Numerical Critical Reasoning Test	.79
Verbal Critical Reasoning Test	.84

Critical Reasoning Test Battery reliability: South African speakers of indigenous languages, updated 2010

Sample composition

The sample consisted of South Africans tested by Psytech SA and collaborators in the period leading up to January 2010. Not all respondents completed both the Numerical and Verbal Critical Reasoning Tests, therefore biographical particulars are reported separately for the two tests.

Sample composition: Numerical Critical Reasoning Test

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	700	700	60.29285	60.2929
F	460	1160	39.62102	99.9139
U	1	1161	0.08613	100.0000
Missing	0	1161	0.00000	100.0000

Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	189	189	16.27907	16.2791
Diploma	434	623	37.38157	53.6606
Grade 12	77	700	6.63221	60.2929
Degree	328	1028	28.25151	88.5444
<Grade 12	4	1032	0.34453	88.8889
Vocational Training	19	1051	1.63652	90.5254
Missing	110	1161	9.47459	100.0000

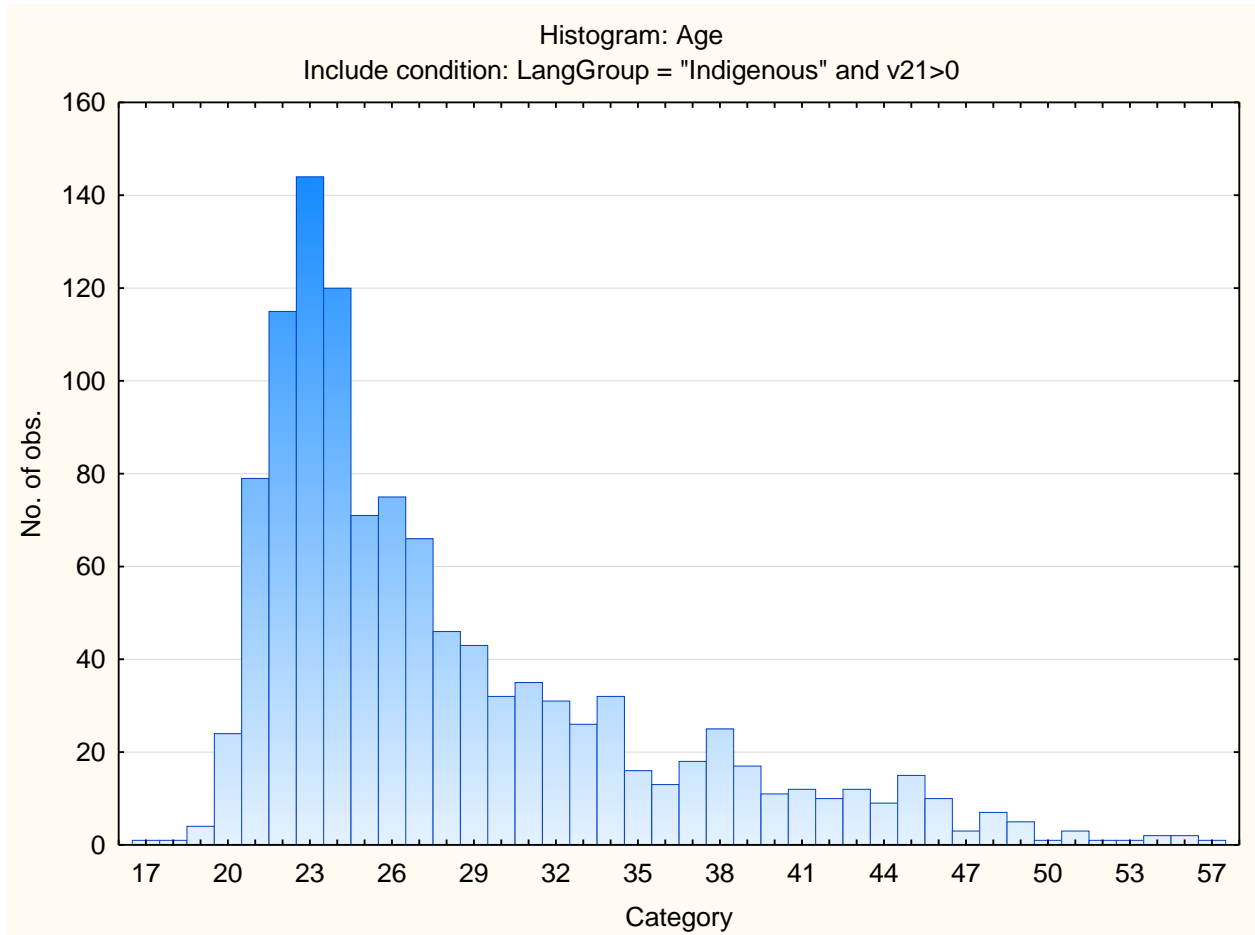
Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Setswana	144	144	12.40310	12.4031
isiZulu	364	508	31.35228	43.7554
Xitsonga	44	552	3.78984	47.5452
isiXhosa	278	830	23.94488	71.4901
Sepedi	77	907	6.63221	78.1223
Tshivenda	45	952	3.87597	81.9983
isiNdebele	11	963	0.94746	82.9457
siSwati	19	982	1.63652	84.5823
Sesotho	179	1161	15.41774	100.0000
Missing	0	1161	0.00000	100.0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	1161	1161	100.0000	100.0000
Missing	0	1161	0.0000	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Asian	6	6	0.51680	0.5168
European	4	10	0.34453	0.8613
African	1146	1156	98.7080 1	99.5693
Missing	5	1161	0.43066	100.0000

	Descriptive Statistics: Age
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Variable	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	28.10184	7.150294	17.00000	57.00000	1139	22



Sample composition: Verbal Critical Reasoning Test

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	700	700	60.50130	60.5013
F	456	1156	39.41227	99.9136
U	1	1157	0.08643	100.0000
Missing	0	1157	0.00000	100.0000

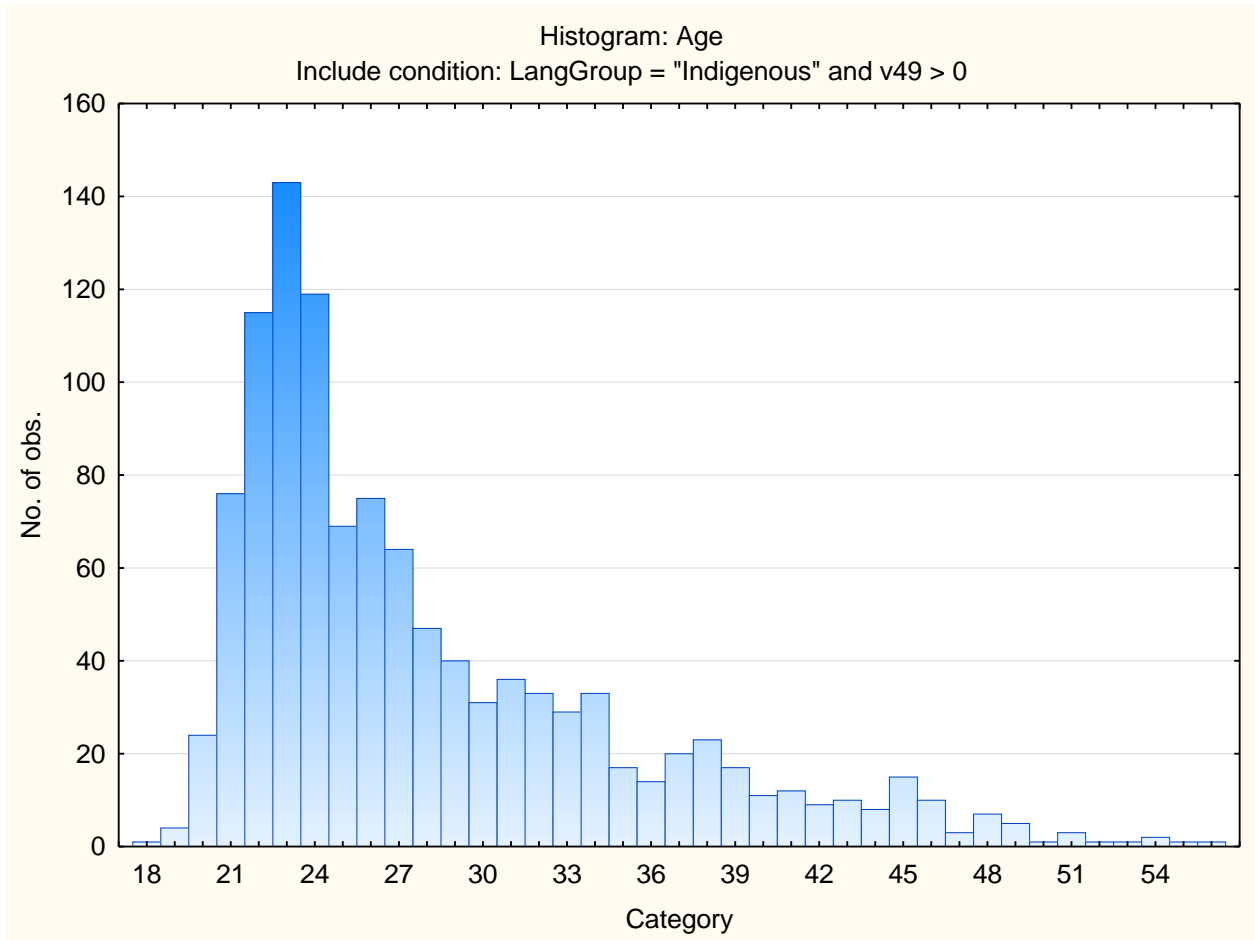
Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	201	201	17.37252	17.3725
Diploma	427	628	36.90579	54.2783
Grade 12	71	699	6.13656	60.4149
Degree	337	1036	29.12705	89.5419
<Grade 12	3	1039	0.25929	89.8012
Vocational Training	16	1055	1.38289	91.1841
Missing	102	1157	8.81590	100.0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Setswana	146	146	12.61884	12.6188
isiZulu	357	503	30.85566	43.4745
Xitsonga	43	546	3.71651	47.1910
isiXhosa	277	823	23.94123	71.1322
Sepedi	79	902	6.82800	77.9602
Tshivenda	47	949	4.06223	82.0225
isiNdebele	10	959	0.86430	82.8868
siSwati	20	979	1.72861	84.6154
Sesotho	178	1157	15.38462	100.0000
Missing	0	1157	0.00000	100.0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenou s	1157	1157	100.000 0	100.0000
Missing	0	1157	0.0000	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Asian	6	6	0.51858	0.5186
European	4	10	0.34572	0.8643
African	1142	1152	98.70354	99.5678
Coloured	1	1153	0.08643	99.6543
Missing	4	1157	0.34572	100.0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No. cases Missing
Age	28.1044 2	7.07054 7	18.00000	57.00000	113 0	27



Internal consistency reliabilities of Critical Reasoning Test Battery subtests

	Cronbach coefficient alpha
Numerical Critical Reasoning Test	.64
Verbal Critical Reasoning Test	.75

Critical Reasoning Test Battery Reliability: South African English speakers updated 2010

Sample composition

The sample consisted of South Africans with English as their home language, tested by Psytech South Africa and collaborators in the period up to January 2010. Not all respondents completed both the Verbal and Numerical Critical Reasoning Tests, therefore the biographical particulars are reported separately for the Numerical and Verbal Critical Reasoning tests.

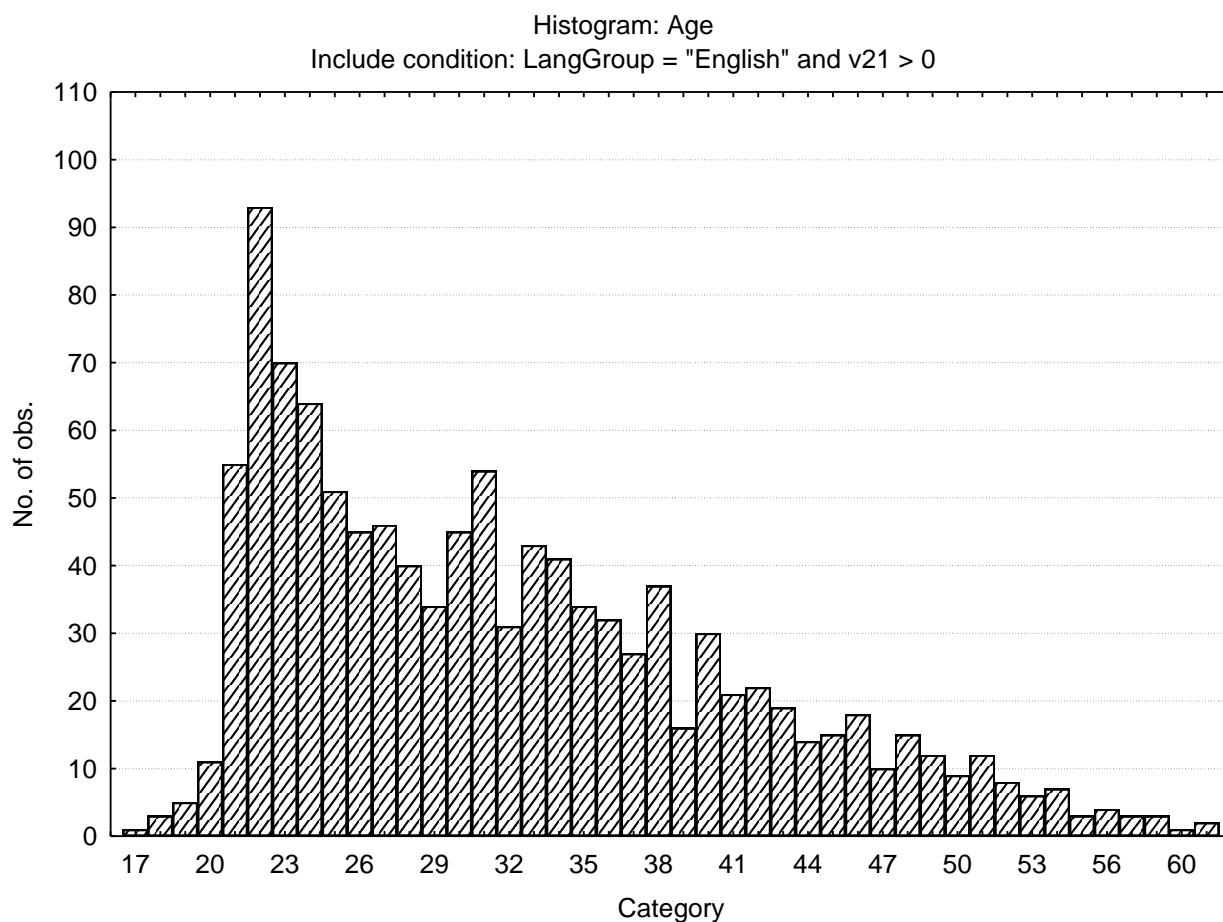
Sample composition: Numerical Critical Reasoning Test

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	853	853	74.36792	74.3679
F	287	1140	25.02180	99.3897
U	7	1147	0.61029	100.0000
Missing	0	1147	0.00000	100.0000

Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	219	219	19.09329	19.0933
Diploma	238	457	20.74978	39.8431
Grade 12	231	688	20.13949	59.9826
Degree	251	939	21.88317	81.8657
<Grade 12	17	956	1.48213	83.3479
Vocational Training	28	984	2.44115	85.7890
Missing	163	1147	14.21099	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Asian	419	419	36.53008	36.5301
European	553	972	48.21273	84.7428
African	56	1028	4.88230	89.6251
Coloured	103	1131	8.97995	98.6051
Missing	16	1147	1.39494	100.0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	31.93975	9.092037	17.00000	62.00000	1112	35



Sample composition: Verbal Critical Reasoning Tests

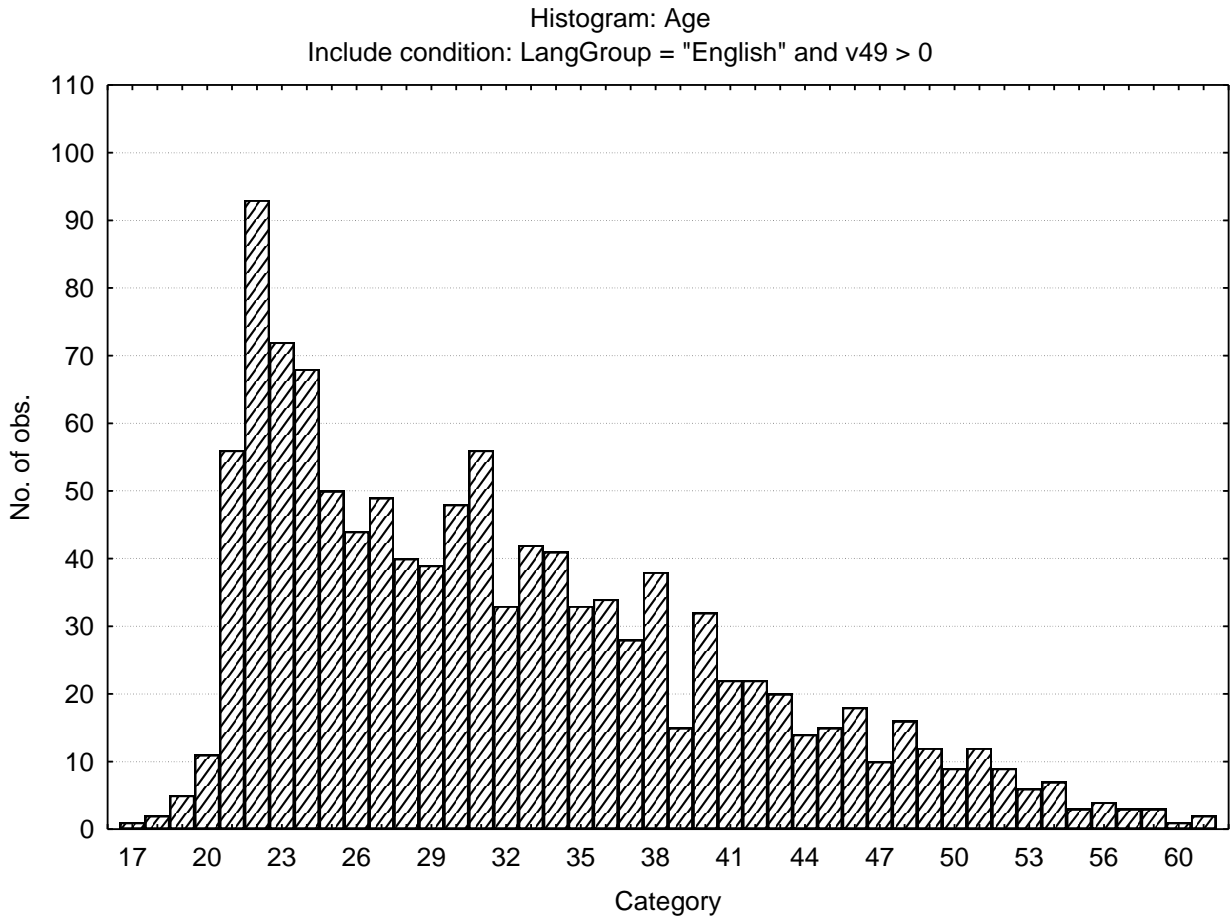
Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	871	871	74.25405	74.2540
F	295	1166	25.14919	99.4032
U	7	1173	0.59676	100.0000
Missing	0	1173	0.00000	100.0000

Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	237	237	20.20460	20.2046
Diploma	240	477	20.46036	40.6650
Grade 12	234	711	19.94885	60.6138

Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Degree	255	966	21.73913	82.3529
<Grade 12	16	982	1.36402	83.7170
Vocational Training	29	1011	2.47229	86.1893
Missing	162	1173	13.81074	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Asian	425	425	36.23188	36.2319
European	571	996	48.67860	84.9105
African	57	1053	4.85934	89.7698
Coloured	104	1157	8.86616	98.6360
Missing	16	1173	1.36402	100.0000

Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	31.94815	9.056353	17.00000	62.00000	1138	35



Internal consistency reliabilities for Critical Reasoning Test Battery subtests

	Cronbach coefficient alpha
Numerical Critical Reasoning Test	.80
Verbal Critical Reasoning Test	.86

Critical Reasoning Test Battery reliability: South African Afrikaans speakers updated 2010

Sample composition

The sample consisted of South Africans who gave their home language as Afrikaans, tested by Psytech South Africa and collaborators in the period up to January 2010. Not all respondents completed both subtests in the battery, therefore biographical particulars are reported separately for the Numerical and Verbal Critical Reasoning Tests respectively.

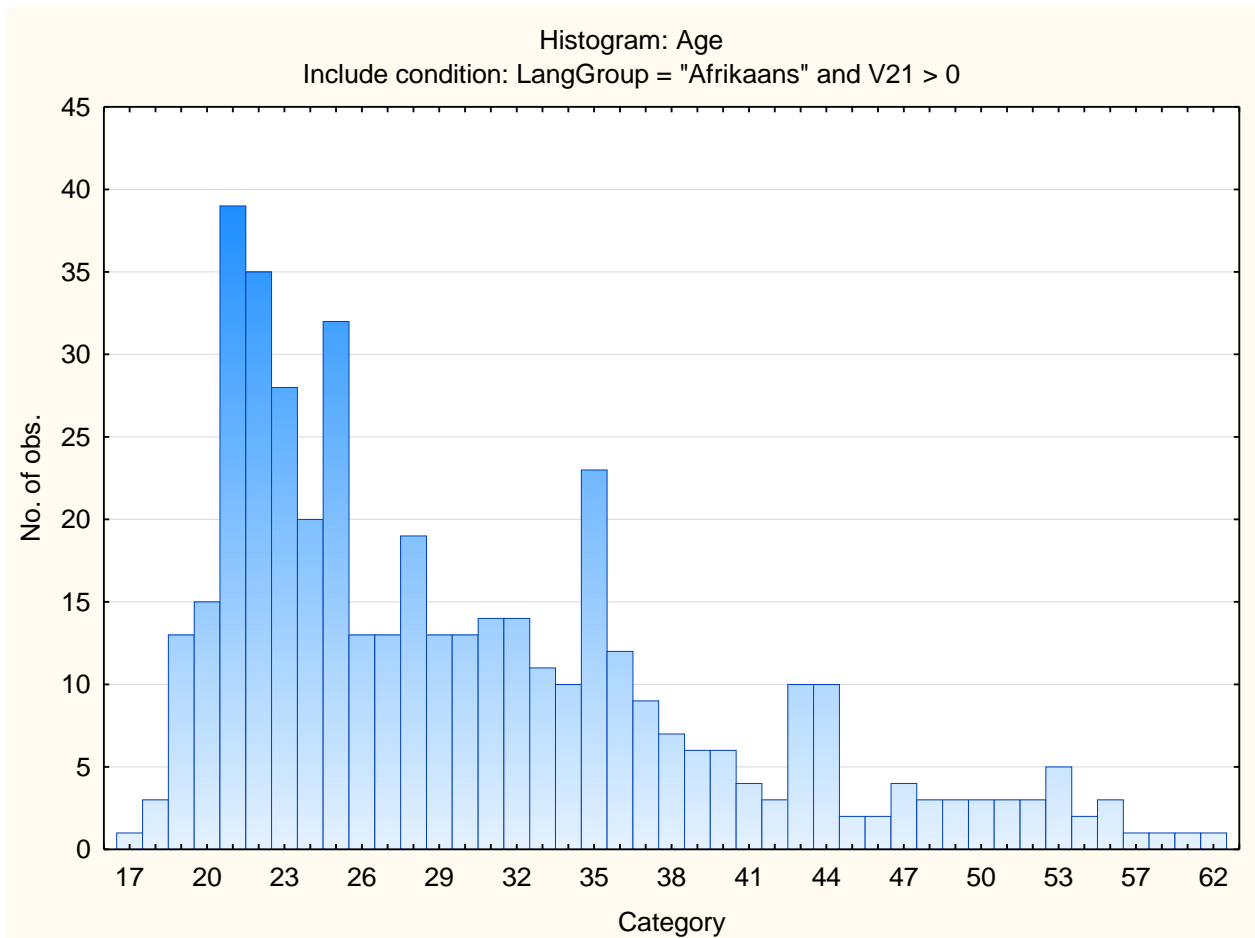
Sample composition: Numerical Critical Reasoning Test

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	292	292	63.06695	63.0670
F	169	461	36.50108	99.5680
U	2	463	0.43197	100.0000
Missing	0	463	0.00000	100.0000

Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	64	64	13.82289	13.8229
Diploma	76	140	16.41469	30.2376
Grade 12	108	248	23.32613	53.5637
Degree	136	384	29.37365	82.9374
<Grade 12	3	387	0.64795	83.5853
Vocational Training	14	401	3.02376	86.6091
Missing	62	463	13.39093	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
European	418	418	90.28078	90.2808
African	5	423	1.07991	91.3607
Coloured	26	449	5.61555	96.9762
Missing	14	463	3.02376	100.0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	30.18245	9.316774	17.00000	62.00000	433	30



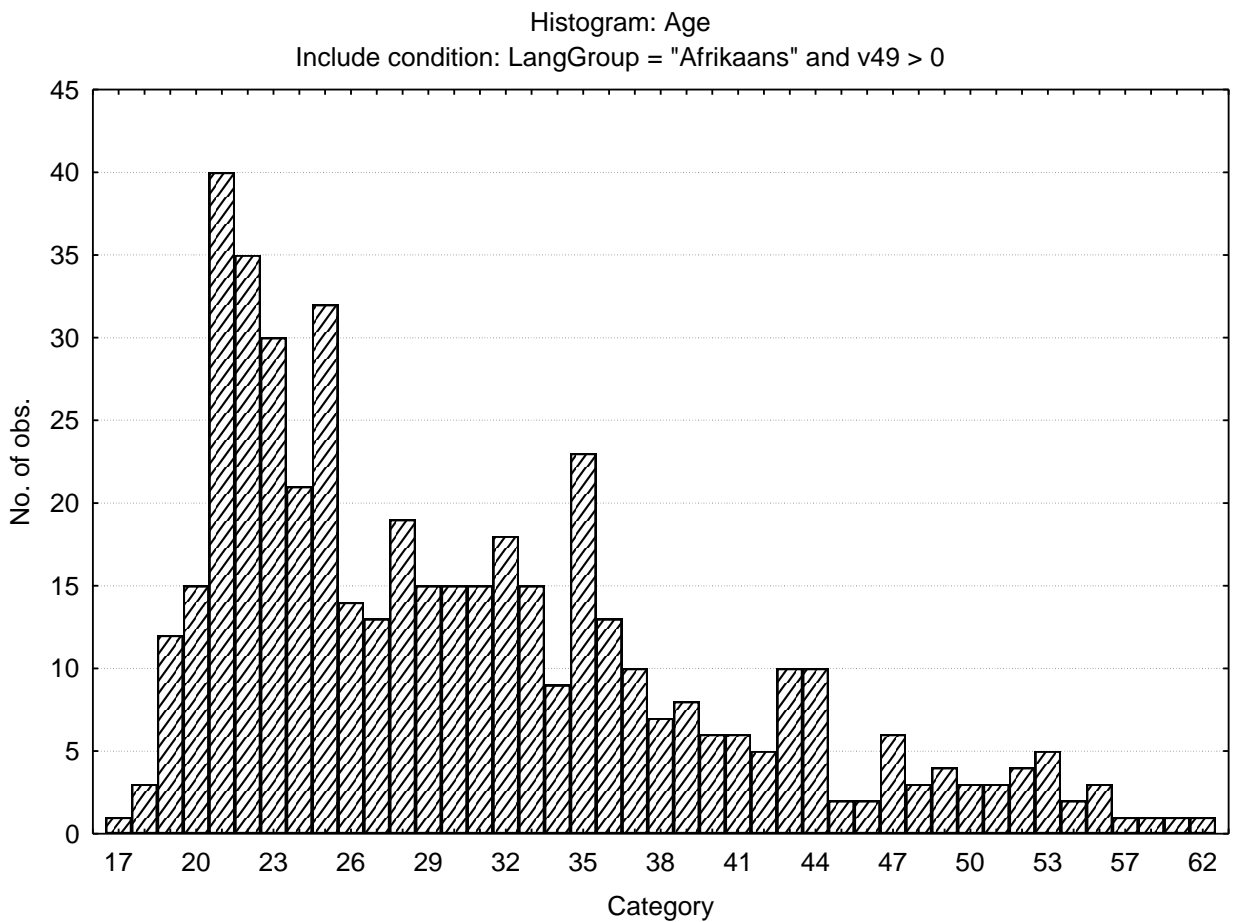
Sample composition: Verbal Critical Reasoning Test

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	313	313	63.36032	63.3603
F	179	492	36.23482	99.5951
U	2	494	0.40486	100.0000
Missing	0	494	0.00000	100.0000

Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	73	73	14.77733	14.7773
Diploma	85	158	17.20648	31.9838
Grade 12	106	264	21.45749	53.4413
Degree	150	414	30.36437	83.8057
<Grade 12	4	418	0.80972	84.6154
Vocational Training	15	433	3.03644	87.6518
Missing	61	494	12.34818	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
European	448	448	90.68826	90.6883
African	7	455	1.41700	92.1053
Coloured	25	480	5.06073	97.1660
Missing	14	494	2.83401	100.0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	30.48590	9.296231	17.00000	62.00000	461	33



Internal Consistency Reliabilities for Critical Reasoning Test Battery subtests

	Cronbach coefficient alpha
Numerical Critical Reasoning Test	.79
Verbal Critical Reasoning Test	.82

Critical Reasoning Test (CRTB2)

Reliability: South Africans, Aggregate Population, Updated 2016

Critical Numerical Reasoning Test: Biographical Composition

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	1547	1547	34,44667	34,4467
M	2910	4457	64,79626	99,2429
U	34	4491	0,75707	100,0000
Missing	0	4491	0,00000	100,0000

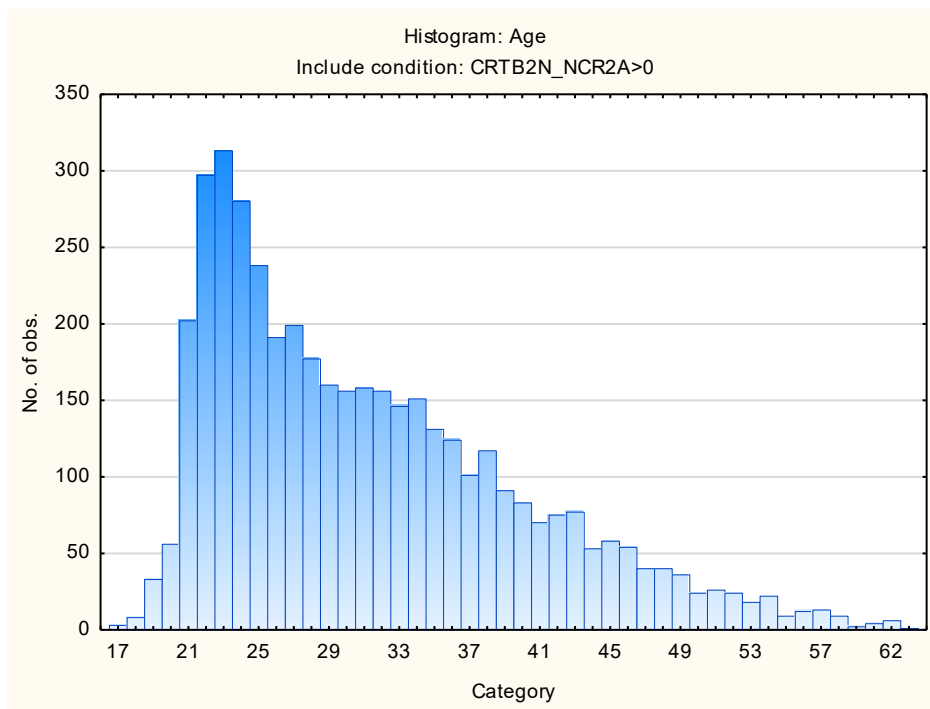
Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	1891	1891	42,10644	42,1064
Post Graduate	727	2618	16,18793	58,2944
Grade 12	664	3282	14,78513	73,0795
< Matric	38	3320	0,84614	73,9256
Missing	1171	4491	26,07437	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Xitsonga	58	58	1,29147	1,2915
English	1367	1425	30,43866	31,7301
Setswana	178	1603	3,96348	35,6936
Sesotho	245	1848	5,45536	41,1490
Sepedi	97	1945	2,15988	43,3088
Afrikaans	581	2526	12,93699	56,2458
isiXhosa	278	2804	6,19016	62,4360
isiZulu	436	3240	9,70831	72,1443
Tshivenda	63	3303	1,40281	73,5471
isiNdebele	17	3320	0,37853	73,9256
siSwati	22	3342	0,48987	74,4155
Missing	1149	4491	25,58450	100,0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	1394	1394	31,03986	31,0399
English	1367	2761	30,43866	61,4785
Afrikaans	581	3342	12,93699	74,4155
Missing	1149	4491	25,58450	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	1601	1601	35,64908	35,6491
Asian	514	2115	11,44511	47,0942
European	1244	3359	27,69984	74,7940
Coloured	167	3526	3,71855	78,5126
Missing	965	4491	21,48742	100,0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No. cases Missing
Age	31,24529	8,714224	17,00000	63,00000	4244	247



Critical Verbal Reasoning Test: Biographical Composition

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	1602	1602	34,22346	34,2235
M	3045	4647	65,05020	99,2737
U	34	4681	0,72634	100,0000
Missing	0	4681	0,00000	100,0000

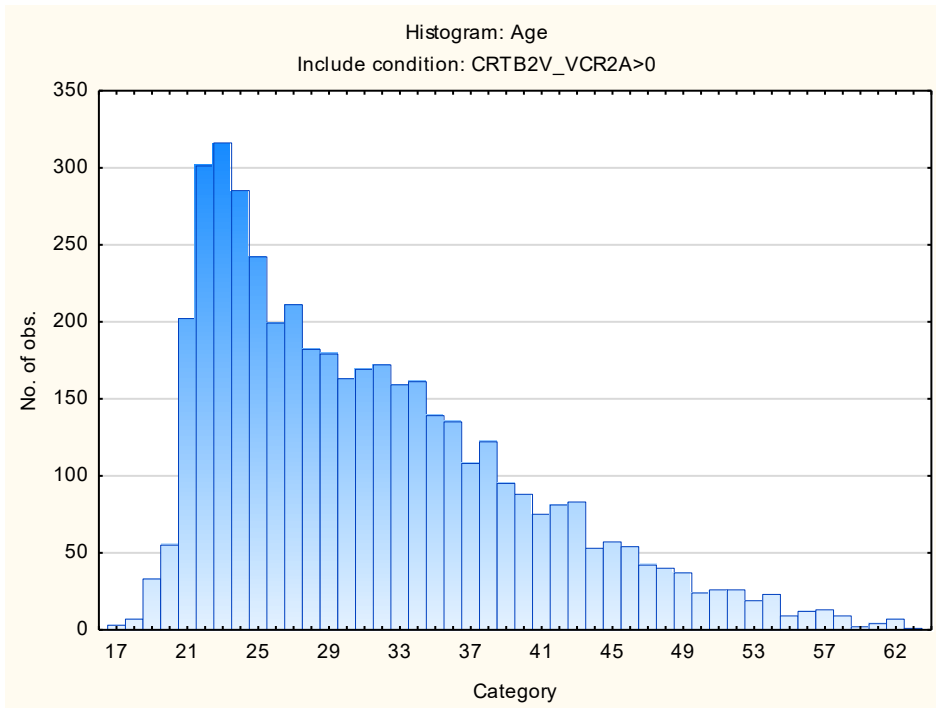
Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	1932	1932	41,27323	41,2732
Post Graduate	767	2699	16,38539	57,6586
Grade 12	658	3357	14,05683	71,7154
< Matric	38	3395	0,81179	72,5272
Missing	1286	4681	27,47276	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Xitsonga	59	59	1,26041	1,2604
English	1389	1448	29,67315	30,9336
Setswana	176	1624	3,75988	34,6934
Sesotho	246	1870	5,25529	39,9487
Sepedi	101	1971	2,15766	42,1064
Afrikaans	611	2582	13,05277	55,1592
isiXhosa	280	2862	5,98163	61,1408
isiZulu	436	3298	9,31425	70,4550
Tshivenda	64	3362	1,36723	71,8223
isiNdebele	17	3379	0,36317	72,1854
siSwati	22	3401	0,46999	72,6554
Missing	1280	4681	27,34458	100,0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	1401	1401	29,92950	29,9295
English	1389	2790	29,67315	59,6026
Afrikaans	611	3401	13,05277	72,6554
Missing	1280	4681	27,34458	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	1609	1609	34,37300	34,3730
Asian	520	2129	11,10874	45,4817
European	1292	3421	27,60094	73,0827
Coloured	167	3588	3,56761	76,6503
Missing	1093	4681	23,34971	100,0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	31,32851	8,644202	17,00000	63,00000	4423	258



Internal Consistency Reliabilities for Critical Reasoning Test Battery Subtests

Subtest	Cronbach Coefficient Alpha
Critical Numerical Reasoning Test	0,82
Critical Verbal Reasoning Test	0,87

Results of lower than 0.75 are possibly related to respondents guessing the answers to items which they may not know. Results should therefore be interpreted with caution. Do not rely on these tests in isolation, but consider the results as part of a holistic assessment, which incorporate additional sources of information.

Critical Reasoning Test (CRTB2)

Reliability: South Africans, Afrikaans Language Group, Updated 2016

Critical Numerical Reasoning Test: Biographical Composition

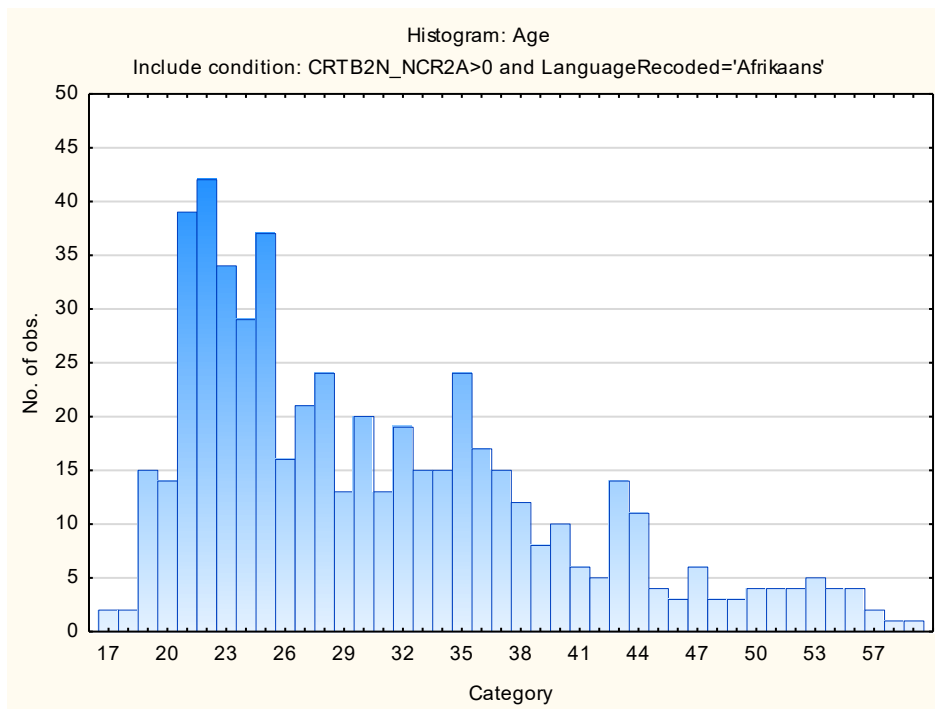
Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	219	219	37,69363	37,6936
M	358	577	61,61790	99,3115
U	4	581	0,68847	100,0000
Missing	0	581	0,00000	100,0000

Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	263	263	45,26678	45,2668
Post Graduate	102	365	17,55594	62,8227
Grade 12	149	514	25,64544	88,4682
< Matric	5	519	0,86059	89,3287
Missing	62	581	10,67126	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Afrikaans	581	581	100,0000	100,0000
Missing	0	581	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	12	12	2,06540	2,0654
European	521	533	89,67298	91,7384
Coloured	36	569	6,19621	97,9346
Missing	12	581	2,06540	100,0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	30,71481	9,236541	17,00000	62,00000	540	41



Critical Verbal Reasoning Test: Biographical Composition

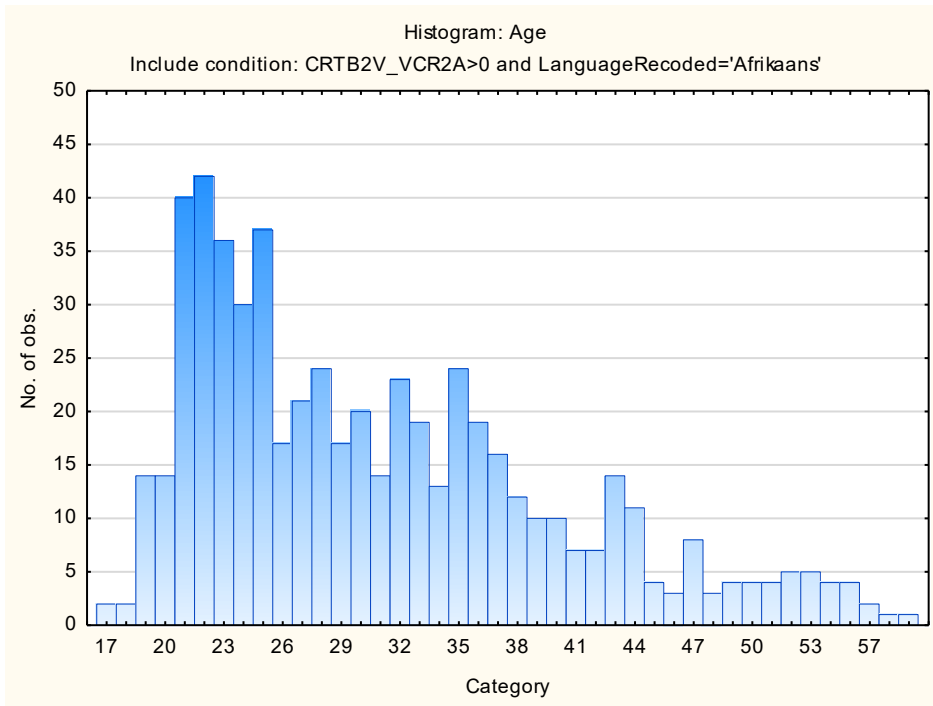
Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	226	226	36,98854	36,9885
M	382	608	62,52046	99,5090
U	3	611	0,49100	100,0000
Missing	0	611	0,00000	100,0000

Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	284	284	46,48118	46,4812
Post Graduate	114	398	18,65794	65,1391
Grade 12	146	544	23,89525	89,0344
< Matric	6	550	0,98200	90,0164
Missing	61	611	9,98363	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Afrikaans	611	611	100,0000	100,0000
Missing	0	611	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	14	14	2,29133	2,2913
European	549	563	89,85270	92,1440
Coloured	36	599	5,89198	98,0360
Missing	12	611	1,96399	100,0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	30,91711	9,212174	17,00000	62,00000	567	44



Internal Consistency Reliabilities for Critical Reasoning Test Battery Subtests

Subtest	Cronbach Coefficient Alpha
Critical Numerical Reasoning Test	0,81
Critical Verbal Reasoning Test	0,84

Results of lower than 0.75 are possibly related to respondents guessing the answers to items which they may not know. Results should therefore be interpreted with caution. Do not rely on these tests in isolation, but consider the results as part of a holistic assessment, which incorporate additional sources of information.

Critical Reasoning Test (CRTB2)

Reliability: South Africans, English Language Group, Updated 2016

Critical Numerical Reasoning Test: Biographical Composition

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	386	386	28,23702	28,2370
M	973	1359	71,17776	99,4148
U	8	1367	0,58522	100,0000
Missing	0	1367	0,00000	100,0000

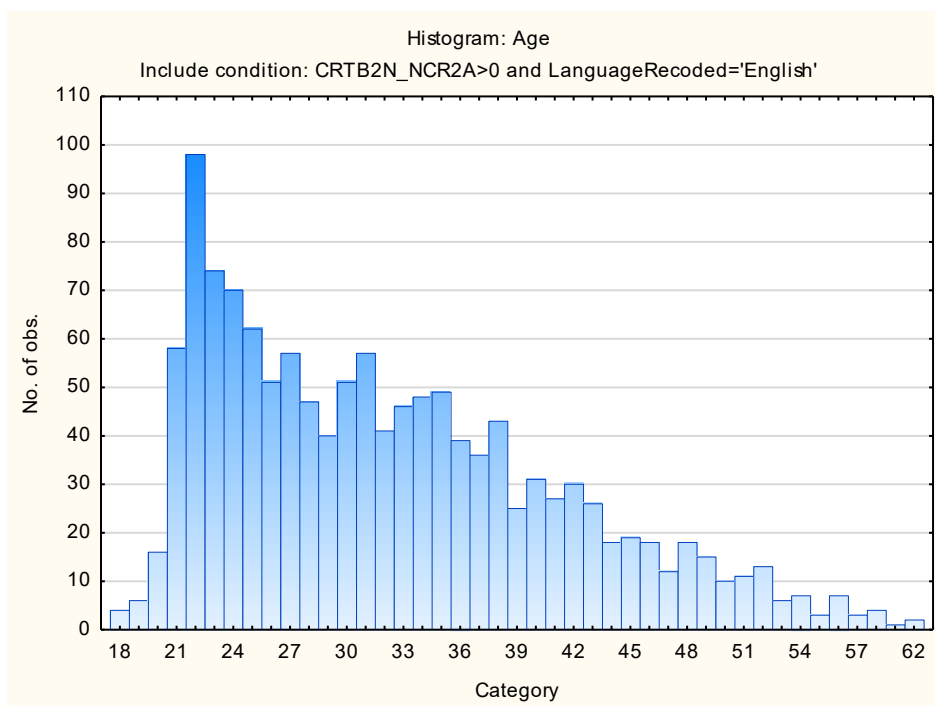
Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	577	577	42,20922	42,2092
Post Graduate	287	864	20,99488	63,2041
Grade 12	326	1190	23,84784	87,0519
< Matric	22	1212	1,60936	88,6613
Missing	155	1367	11,33870	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
English	1367	1367	100,0000	100,0000
Missing	0	1367	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	91	91	6,65691	6,6569
Asian	460	551	33,65033	40,3072
European	671	1222	49,08559	89,3928

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
Coloured	124	1346	9,07096	98,4638
Missing	21	1367	1,53621	100,0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	32,26482	9,056785	18,00000	62,00000	1299	68



Critical Verbal Reasoning Test: Biographical Composition

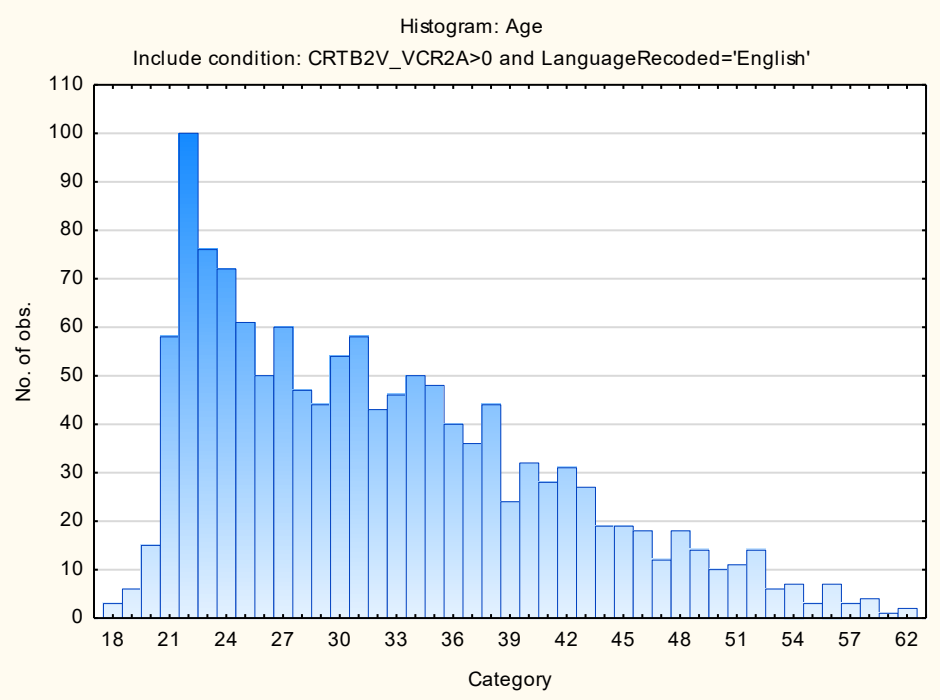
Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	396	396	28,50972	28,5097
M	985	1381	70,91433	99,4240
U	8	1389	0,57595	100,0000
Missing	0	1389	0,00000	100,0000

Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	582	582	41,90065	41,9006
Post Graduate	303	885	21,81425	63,7149
Grade 12	329	1214	23,68611	87,4010
< Matric	21	1235	1,51188	88,9129
Missing	154	1389	11,08711	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
English	1389	1389	100,0000	100,0000
Missing	0	1389	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	91	91	6,55148	6,5515
Asian	466	557	33,54932	40,1008
European	689	1246	49,60403	89,7048
Coloured	123	1369	8,85529	98,5601
Missing	20	1389	1,43988	100,0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	32,26646	9,015063	18,00000	62,00000	1321	68



Internal Consistency Reliabilities for Critical Reasoning Test Battery Subtests

Subtest	Cronbach Coefficient Alpha
Critical Numerical Reasoning Test	0,80
Critical Verbal Reasoning Test	0,86

Results of lower than 0.75 are possibly related to respondents guessing the answers to items which they may not know. Results should therefore be interpreted with caution. Do not rely on these tests in isolation, but consider the results as part of a holistic assessment, which incorporate additional sources of information.

Critical Reasoning Test (CRTB2)

Reliability: South Africans, isiXhosa Language Group, Updated 2016

Critical Numerical Reasoning Test: Biographical Composition

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	114	114	41,00719	41,0072
M	163	277	58,63309	99,6403
U	1	278	0,35971	100,0000
Missing	0	278	0,00000	100,0000

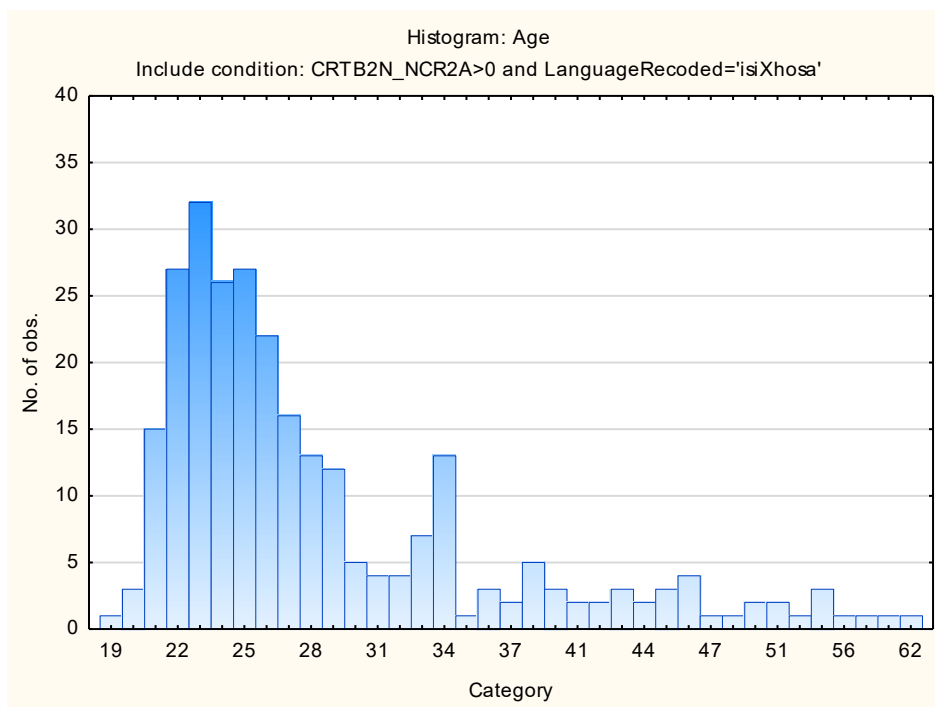
Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	195	195	70,14388	70,1439
Post Graduate	59	254	21,22302	91,3669
Grade 12	12	266	4,31655	95,6835
Missing	12	278	4,31655	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
isiXhosa	278	278	100,0000	100,0000
Missing	0	278	0,0000	100,0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	278	278	100,0000	100,0000
Missing	0	278	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	273	273	98,20144	98,2014
Asian	2	275	0,71942	98,9209
European	2	277	0,71942	99,6403
Missing	1	278	0,35971	100,0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	28,70849	8,260116	19,00000	62,00000	271	7



Critical Verbal Reasoning Test: Biographical Composition

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	116	116	41,42857	41,4286
M	163	279	58,21429	99,6429
U	1	280	0,35714	100,0000
Missing	0	280	0,00000	100,0000

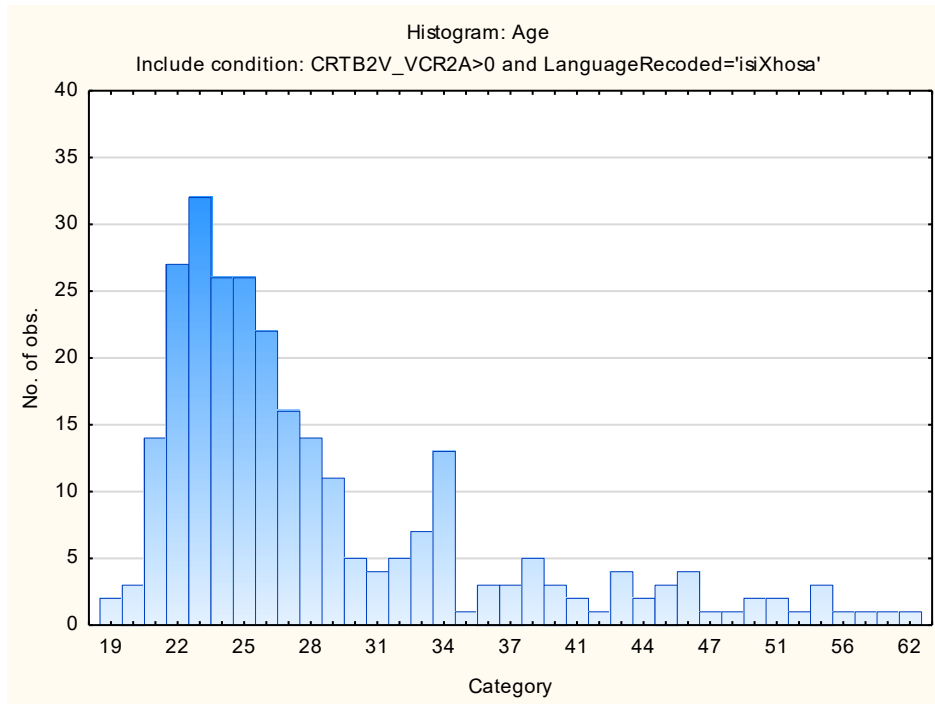
Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	198	198	70,71429	70,7143
Post Graduate	59	257	21,07143	91,7857
Grade 12	10	267	3,57143	95,3571
< Matric	1	268	0,35714	95,7143
Missing	12	280	4,28571	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
isiXhosa	280	280	100,0000	100,0000
Missing	0	280	0,0000	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	280	280	100,0000	100,0000
Missing	0	280	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	273	273	97,50000	97,5000
Asian	3	276	1,07143	98,5714
European	2	278	0,71429	99,2857
Coloured	1	279	0,35714	99,6429
Missing	1	280	0,35714	100,0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	28,75735	8,273459	19,00000	62,00000	272	8



Internal Consistency Reliabilities for Critical Reasoning Test Battery Subtests

Subtest	Cronbach Coefficient Alpha
Critical Numerical Reasoning Test	0,69
Critical Verbal Reasoning Test	0,79

Results of lower than 0.75 are possibly related to respondents guessing the answers to items which they may not know. Results should therefore be interpreted with caution. Do not rely on these tests in isolation, but consider the results as part of a holistic assessment, which incorporate additional sources of information.

Critical Reasoning Test (CRTB2)

Reliability: South Africans, isiZulu Language Group, Updated 2016

Critical Numerical Reasoning Test: Biographical Composition

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	160	160	36,69725	36,6972
M	275	435	63,07339	99,7706
U	1	436	0,22936	100,0000
Missing	0	436	0,00000	100,0000

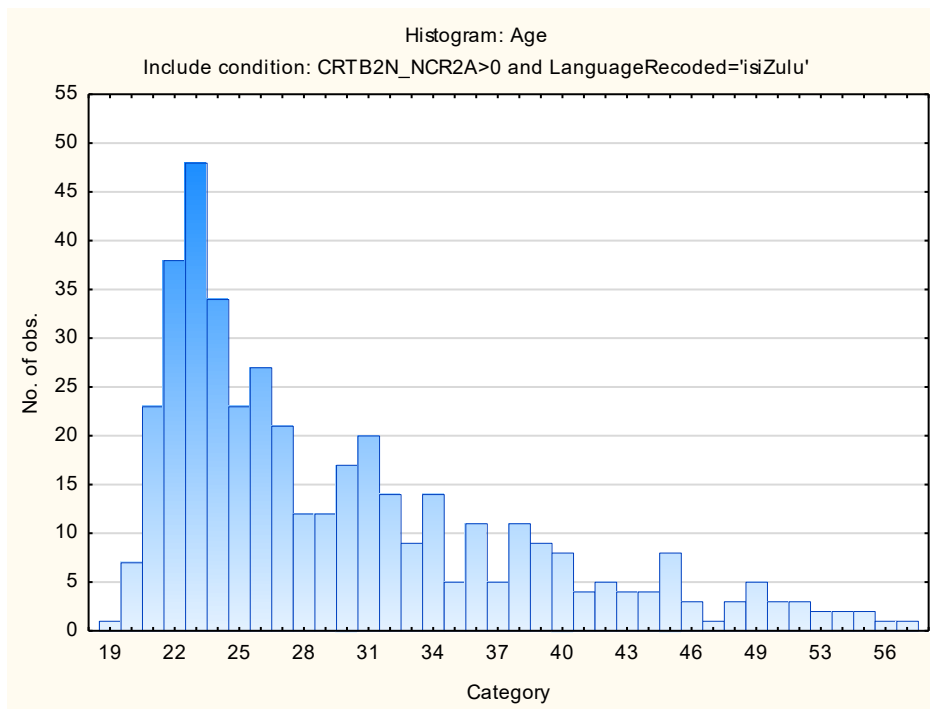
Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	265	265	60,77982	60,7798
Post Graduate	78	343	17,88991	78,6697
Grade 12	57	400	13,07339	91,7431
< Matric	8	408	1,83486	93,5780
Missing	28	436	6,42202	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
isiZulu	436	436	100,0000	100,0000
Missing	0	436	0,0000	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	436	436	100,0000	100,0000
Missing	0	436	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	431	431	98,85321	98,8532
Asian	2	433	0,45872	99,3119
European	2	435	0,45872	99,7706
Missing	1	436	0,22936	100,0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	29,80714	8,327053	19,00000	58,00000	420	16



Critical Verbal Reasoning Test: Biographical Composition

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	158	158	36,23853	36,2385
M	278	436	63,76147	100,0000
Missing	0	436	0,00000	100,0000

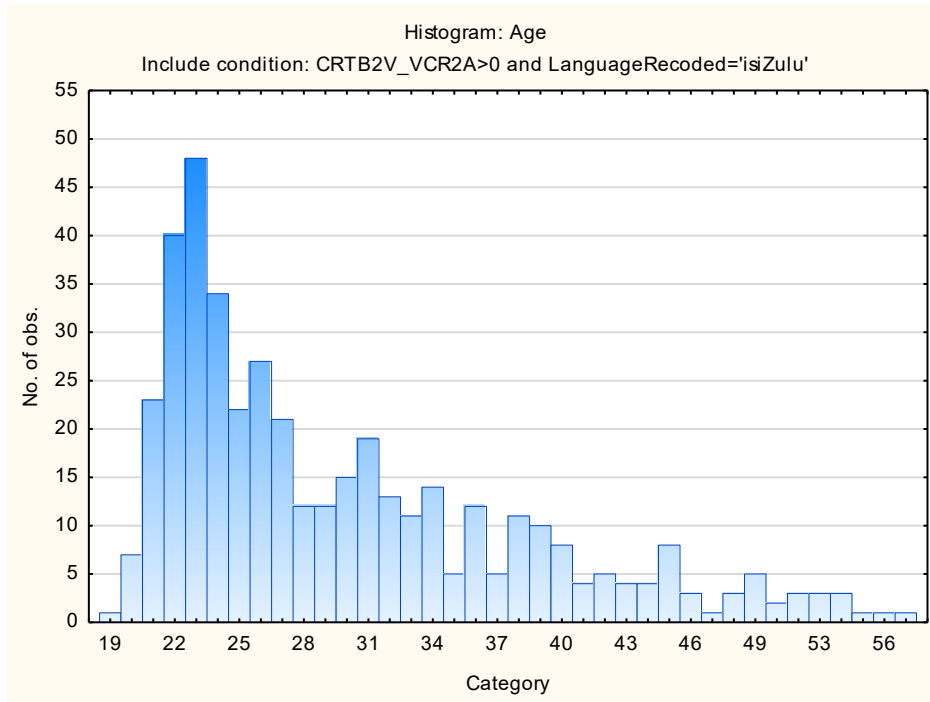
Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	266	266	61,00917	61,0092
Post Graduate	80	346	18,34862	79,3578
Grade 12	57	403	13,07339	92,4312
< Matric	7	410	1,60550	94,0367
Missing	26	436	5,96330	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
isiZulu	436	436	100,0000	100,0000
Missing	0	436	0,0000	100,0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	436	436	100,0000	100,0000
Missing	0	436	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	431	431	98,85321	98,8532
Asian	2	433	0,45872	99,3119
European	2	435	0,45872	99,7706
Missing	1	436	0,22936	100,0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	29,82898	8,362286	19,00000	58,00000	421	15



Internal Consistency Reliabilities for Critical Reasoning Test Battery Subtests

Subtest	Cronbach Coefficient Alpha
Critical Numerical Reasoning Test	0,68
Critical Verbal Reasoning Test	0,78

Results of lower than 0.75 are possibly related to respondents guessing the answers to items which they may not know. Results should therefore be interpreted with caution. Do not rely on these tests in isolation, but consider the results as part of a holistic assessment, which incorporate additional sources of information.

Critical Reasoning Test (CRTB2)

Reliability: South Africans, Setswana Language Group, Updated 2016

Critical Numerical Reasoning Test: Biographical Composition

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	96	96	53,93258	53,9326
M	82	178	46,06742	100,0000
Missing	0	178	0,00000	100,0000

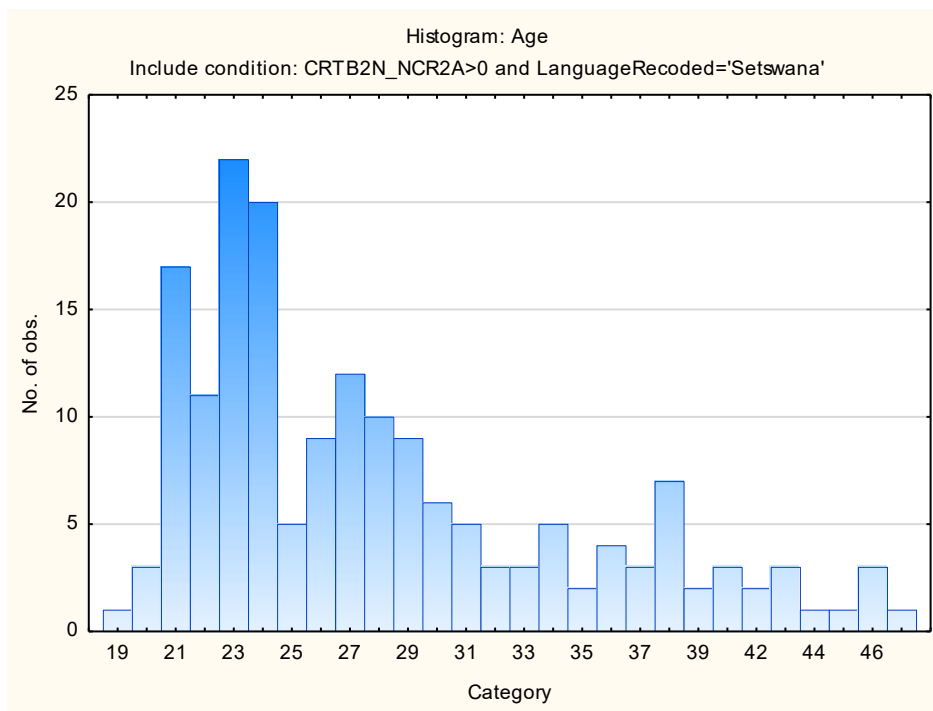
Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	115	115	64,60674	64,6067
Post Graduate	23	138	12,92135	77,5281
Grade 12	30	168	16,85393	94,3820
< Matric	1	169	0,56180	94,9438
Missing	9	178	5,05618	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Setswana	178	178	100,0000	100,0000
Missing	0	178	0,0000	100,0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	178	178	100,0000	100,0000
Missing	0	178	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	178	178	100,0000	100,0000
Missing	0	178	0,0000	100,0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	28,13873	6,788615	19,00000	51,00000	173	5



Critical Verbal Reasoning Test: Biographical Composition

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	90	90	51,13636	51,1364
M	86	176	48,86364	100,0000
Missing	0	176	0,00000	100,0000

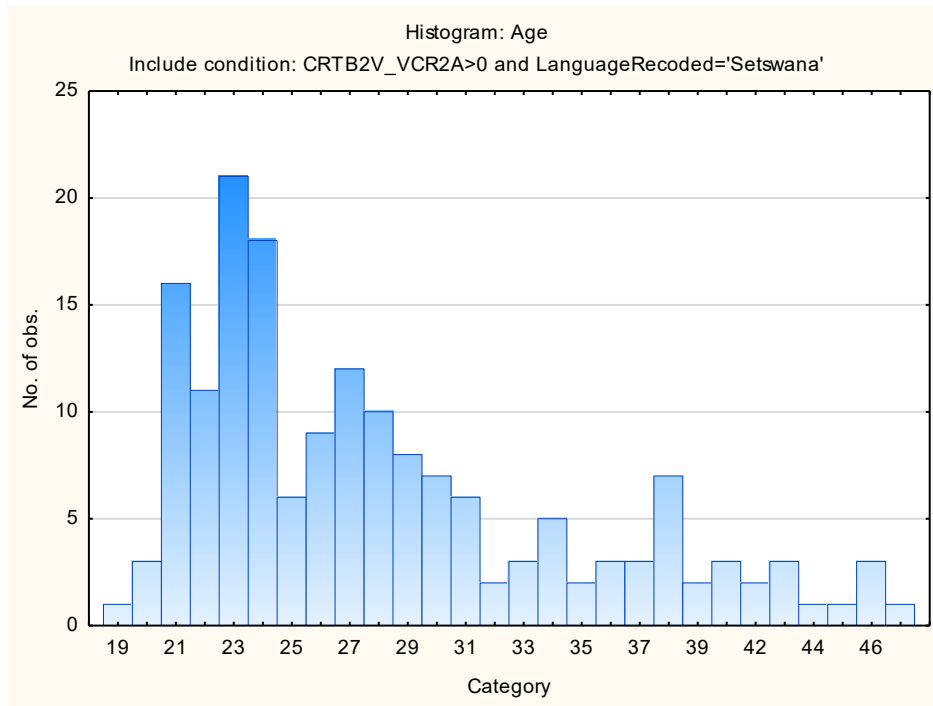
Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	114	114	64,77273	64,7727
Post Graduate	26	140	14,77273	79,5455
Grade 12	27	167	15,34091	94,8864
< Matric	1	168	0,56818	95,4545
Missing	8	176	4,54545	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Setswana	176	176	100,0000	100,0000
Missing	0	176	0,0000	100,0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	176	176	100,0000	100,0000
Missing	0	176	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	176	176	100,0000	100,0000
Missing	0	176	0,0000	100,0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	28,19527	6,795725	19,00000	51,00000	169	7



Internal Consistency Reliabilities for Critical Reasoning Test Battery Subtests

Subtest	Cronbach Coefficient Alpha
Critical Numerical Reasoning Test	0,61
Critical Verbal Reasoning Test	0,74

Results of lower than 0.75 are possibly related to respondents guessing the answers to items which they may not know. Results should therefore be interpreted with caution. Do not rely on these tests in isolation, but consider the results as part of a holistic assessment, which incorporate additional sources of information.

Critical Reasoning Test (CRTB2)

Reliability: South Africans, Sesotho Language Group, Updated 2016

Critical Numerical Reasoning Test: Biographical Composition

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	113	113	46,12245	46,1224
M	132	245	53,87755	100,0000
Missing	0	245	0,00000	100,0000

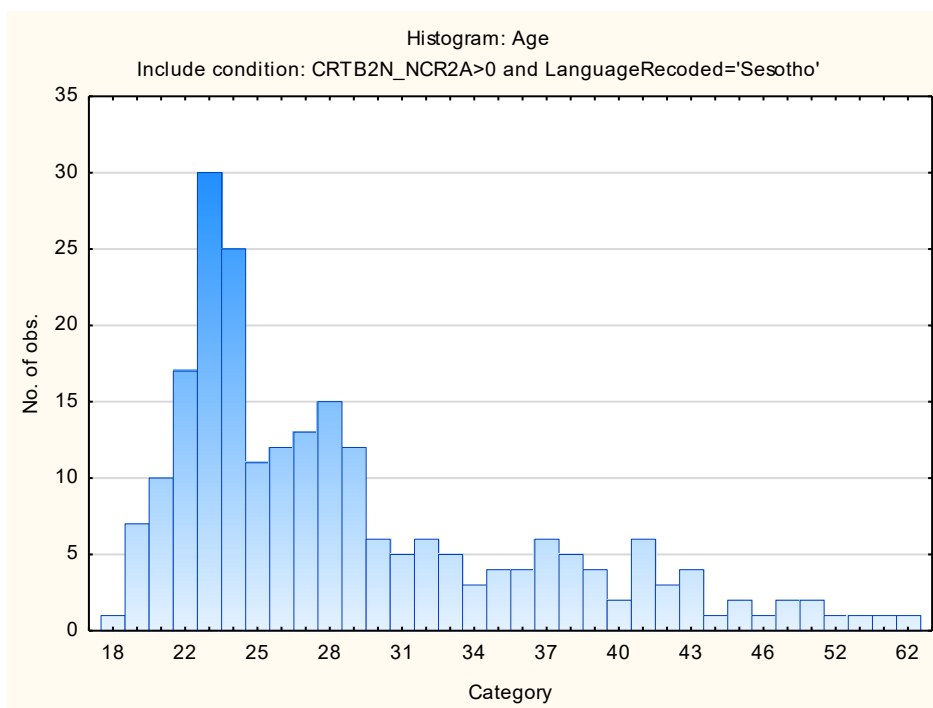
Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	157	157	64,08163	64,0816
Post Graduate	45	202	18,36735	82,4490
Grade 12	30	232	12,24490	94,6939
< Matric	1	233	0,40816	95,1020
Missing	12	245	4,89796	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Sesotho	245	245	100,0000	100,0000
Missing	0	245	0,0000	100,0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	245	245	100,0000	100,0000
Missing	0	245	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	245	245	100,0000	100,0000
Missing	0	245	0,0000	100,0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	28,95614	7,781589	18,00000	62,00000	228	17



Critical Verbal Reasoning Test: Biographical Composition

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	113	113	45,93496	45,9350
M	133	246	54,06504	100,0000
Missing	0	246	0,00000	100,0000

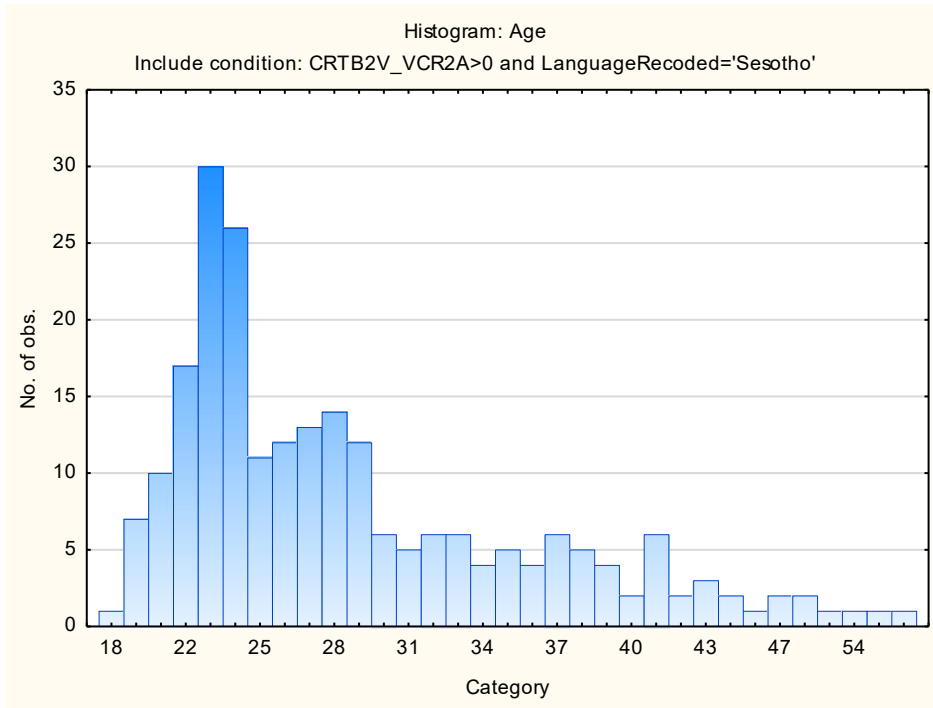
Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	158	158	64,22764	64,2276
Post Graduate	47	205	19,10569	83,3333
Grade 12	28	233	11,38211	94,7154
< Matric	1	234	0,40650	95,1220
Missing	12	246	4,87805	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Sesotho	246	246	100,0000	100,0000
Missing	0	246	0,0000	100,0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	246	246	100,0000	100,0000
Missing	0	246	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	246	246	100,0000	100,0000
Missing	0	246	0,0000	100,0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	28,82018	7,639922	18,00000	62,00000	228	18



Internal Consistency Reliabilities for Critical Reasoning Test Battery Subtests

Subtest	Cronbach Coefficient Alpha
Critical Numerical Reasoning Test	0,58
Critical Verbal Reasoning Test	0,79

Results of lower than 0.75 are possibly related to respondents guessing the answers to items which they may not know. Results should therefore be interpreted with caution. Do not rely on these tests in isolation, but consider the results as part of a holistic assessment, which incorporate additional sources of information.

Critical Reasoning Test (CRTB2)

Reliability: South Africans, Indigenous Language Group, Updated 2016

Critical Numerical Reasoning Test: Biographical Composition

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	573	573	41,10473	41,1047
M	819	1392	58,75179	99,8565
U	2	1394	0,14347	100,0000
Missing	0	1394	0,00000	100,0000

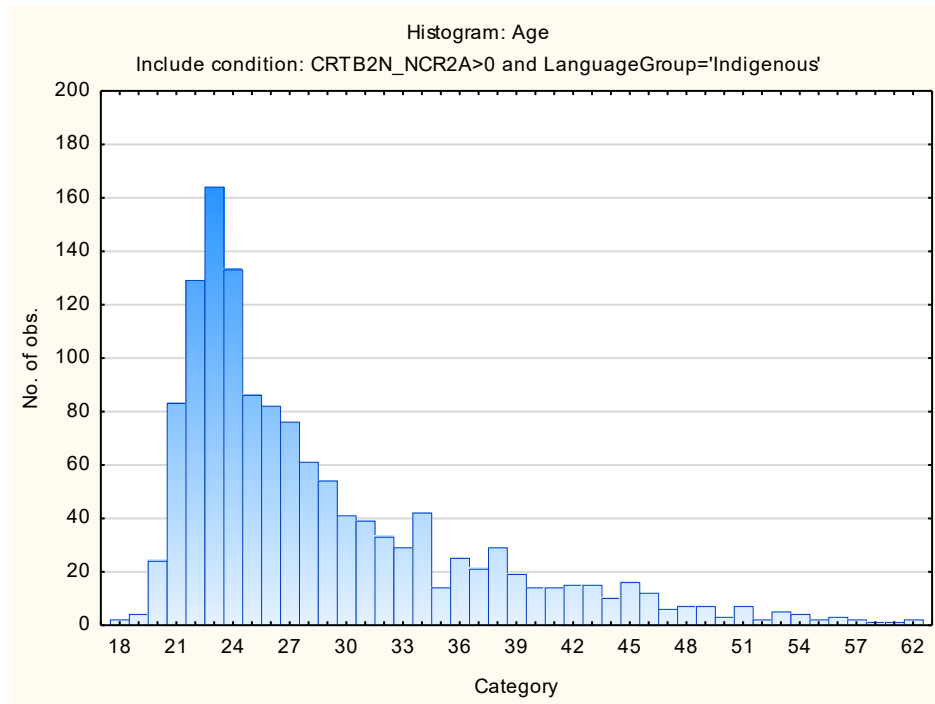
Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	906	906	64,99283	64,9928
Post Graduate	250	1156	17,93400	82,9268
Grade 12	158	1314	11,33429	94,2611
< Matric	10	1324	0,71736	94,9785
Missing	70	1394	5,02152	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Xitsonga	58	58	4,16069	4,1607
Setswana	178	236	12,76901	16,9297
Sesotho	245	481	17,57532	34,5050
Sepedi	97	578	6,95839	41,4634
isiXhosa	278	856	19,94261	61,4060
isiZulu	436	1292	31,27690	92,6829
Tshivenda	63	1355	4,51937	97,2023
isiNdebele	17	1372	1,21951	98,4218
siSwati	22	1394	1,57819	100,0000
Missing	0	1394	0,00000	100,0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	1394	1394	100,0000	100,0000
Missing	0	1394	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	1377	1377	98,78049	98,7805
Asian	7	1384	0,50215	99,2826
European	7	1391	0,50215	99,7848
Coloured	1	1392	0,07174	99,8565
Missing	2	1394	0,14347	100,0000

Variable	Descriptive Statistics Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	28,73094	7,812554	18,00000	62,00000	1338	56



Critical Verbal Reasoning Test: Biographical Composition

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	570	570	40,68522	40,6852
M	830	1400	59,24340	99,9286
U	1	1401	0,07138	100,0000
Missing	0	1401	0,00000	100,0000

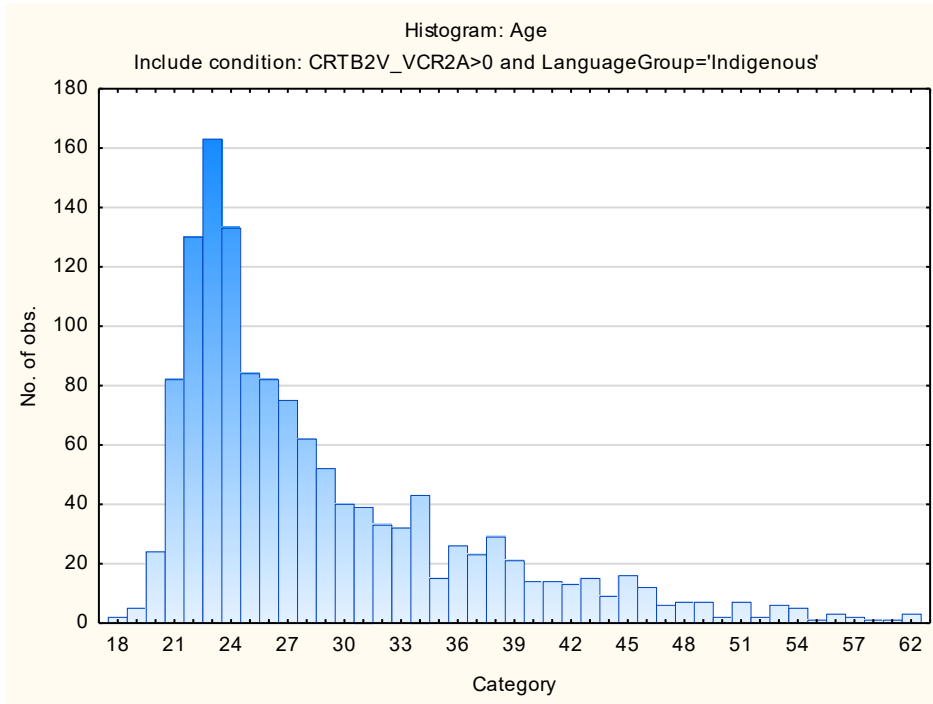
Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	910	910	64,95360	64,9536
Post Graduate	261	1171	18,62955	83,5832
Grade 12	153	1324	10,92077	94,5039
< Matric	10	1334	0,71378	95,2177
Missing	67	1401	4,78230	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Xitsonga	59	59	4,21128	4,2113
Setswana	176	235	12,56246	16,7737
Sesotho	246	481	17,55889	34,3326
Sepedi	101	582	7,20914	41,5418
isiXhosa	280	862	19,98572	61,5275
isiZulu	436	1298	31,12063	92,6481
Tshivenda	64	1362	4,56817	97,2163
isiNdebele	17	1379	1,21342	98,4297
siSwati	22	1401	1,57031	100,0000
Missing	0	1401	0,00000	100,0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	1401	1401	100,0000	100,0000
Missing	0	1401	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	1382	1382	98,64383	98,6438
Asian	8	1390	0,57102	99,2148
European	7	1397	0,49964	99,7145
Coloured	2	1399	0,14276	99,8572
Missing	2	1401	0,14276	100,0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	28,78001	7,858169	18,00000	62,00000	1341	60



Internal Consistency Reliabilities for Critical Reasoning Test Battery Subtests

Subtest	Cronbach Coefficient Alpha
Critical Numerical Reasoning Test	0,65
Critical Verbal Reasoning Test	0,77

Results of lower than 0.75 are possibly related to respondents guessing the answers to items which they may not know. Results should therefore be interpreted with caution. Do not rely on these tests in isolation, but consider the results as part of a holistic assessment, which incorporate additional sources of information.

Critical Reasoning Test Battery (CRTB2)

Norms Introduction

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South African Norms available for the Critical Reasoning Test Battery (CRTB2)

Different types of norms available

There are two kinds of norms available for Psytech tests. Many of the norm groups are based on means and standard deviations obtained through research. These means and standard deviations are used by the GeneSys reporting software to calculate standard scores. In the case of the CRTB2, stanines are used.

Users of the test do not need to look up raw scores to find the corresponding standard scores, because the software does it for them. For this manual, however, stanine tables have been specially calculated from means and standard deviations to facilitate comparison between norm groups, so that users can more easily choose which norm group is most suitable for a given situation. This allows users to make a more informed choice rather than simply relying on automatic choices made by the online platform.

The second type of norm is the frequency norm. In this case, more information is stored internally, and it is possible to add additional cases to the norm group as more data are collected. The GeneSys online platform is able to create tables of standard scores for frequency norms. The tables of standard scores are provided for interest and information, which would assist when comparing one norm group with another. For the purpose of generating a report, the online system does the calculations internally, and doesn't refer to any tables.

Biographical data

The GeneSys online platform offers the facility to collect comprehensive biographical information on respondents. Unfortunately, test users very seldom collect these data. Having this information incomplete poses a serious concern for us as Psytech SA obtains most of its information from clients who use the assessments.

Users are advised to make an effort to capture full biographical information on the respondents. This will help to enable them to adhere to best practice and compliance with legal requirements.

SA Norms and international norms

The GeneSys online platform contains international norms on all Psytech tests, besides the South African norms that have been collected by Psytech South Africa.

Unless you have a very good reason to do otherwise, we recommend the use of South African norms rather than international norms. The South Africa norms are clearly marked with 'SA' in the heading. All other norms that do not include 'South Africa' or 'SA' in the heading are international norms. If you are assessing a person for placement overseas and you have a suitable international norm available, you could consider using the international norm in conjunction with a South African norm.

Outdated or unsuitable norms are subject to removal from the GeneSys online platform, but would still be reflected in the South African User Guide as it serves as a repository of all research that has been done to date.

User-developed norms

The GeneSys online platform offers users the facility to generate their own norms on the data they have collected - these are frequency norms. Users must ensure that the data included in these in-house norms are “clean” – that they contain no dummy cases resulting from experimenting with the software, duplicates or other data that could interfere with the interpretation of the results. Psytech SA offers assistance in the creation of in-house norms for users who need it. If the norm group was generated on your own computer and not shared with Psytech SA, it will not appear in the documentation.

The norms we recommend and have calculated are based on standard deviations and means and are only added to the online system after they have done through an elaborate process of cleaning the data by removing duplicates, dummy and test cases and other data to make sure that users are using norms that were calculated on uncontaminated data (as far as is possible).

Choose the comparison group with care. Bear in mind factors such as race, language, level of education and level of proficiency in English.

List of South African norm groups for the Critical Reasoning Test Battery (CRTB2)

Description	Study number
SA Business School Applicants	N1
SA General Population	N2
SA Insurance Sales Agents	N3
SA Managers and Graduates	N4
SA General Population updated 2008	N5
SA General Population 2002-2006	N6
SA African updated 2010	N7
SA Coloured updated 2010	N8
SA European updated 2010	N9
SA Asian updated 2010	N10
SA General Population updated 2010	N11
SA Indigenous languages updated 2010	N12
SA Afrikaans updated 2010	N13
SA English updated 2010	N14
SA Aggregate Population 2016	N15
SA Afrikaans 2016	N16
SA English 2016	N17
SA isiXhosa 2016	N18
SA isiZulu 2016	N19
SA Setswana 2016	N20
SA Sesotho 2016	N21
SA Indigenous 2016	N22

CRTB2 Norm group: SA Business School Applicants

Applicants to a business school in Gauteng, applying for admission to either the Masters of Business Administration degree or the Postgraduate Diploma in Business Administration. Data were collected during the period 2000-2002.

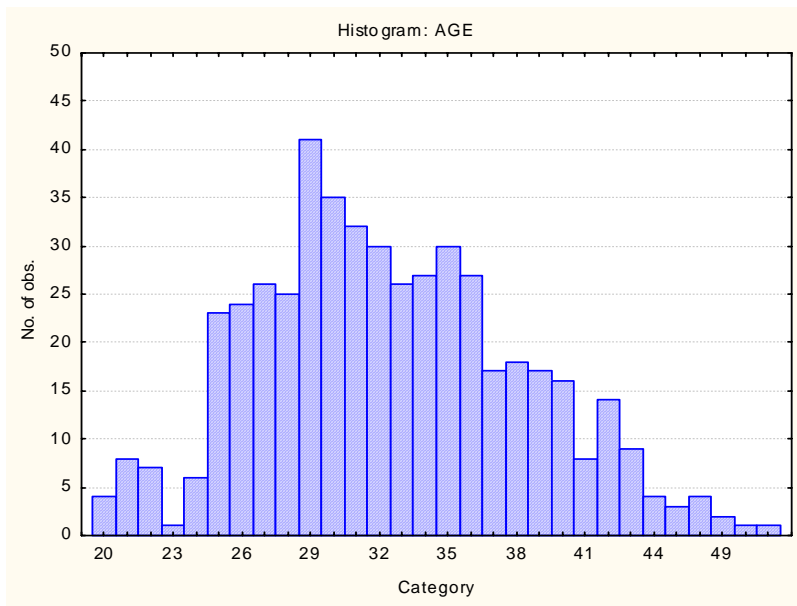
Sample composition

Category	Frequency table: RACE			
	Count	Cumulative Count	Percent	Cumulative Percent
Black	174	174	35.22267	35.2227
White	236	410	47.77328	82.9960
Asian	34	444	6.88259	89.8785
Coloured	12	456	2.42915	92.3077
Missing	38	494	7.69231	100.0000

Category	Frequency table: GENDER			
	Count	Cumulative Count	Percent	Cumulative Percent
Female	149	149	30.16194	30.1619
Male	338	487	68.42105	98.5830
Undisclosed	1	488	0.20243	98.7854
Missing	6	494	1.21457	100.0000

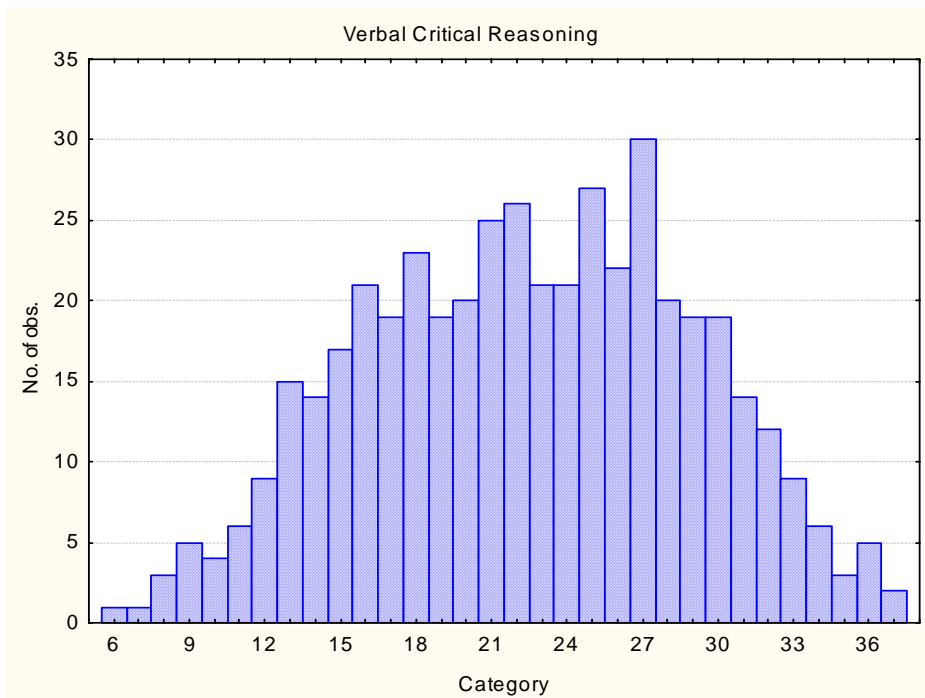
Category	Frequency table: LANGUAGE			
	Count	Cumulative Count	Percent	Cumulative Percent
eng	213	213	43.11741	43.1174
afr	74	287	14.97976	58.0972
shona	6	293	1.21457	59.3117
sesotho	5	298	1.01215	60.3239
zulu	35	333	7.08502	67.4089
danish	2	335	0.40486	67.8138
xhosa	22	357	4.45344	72.2672
tsonga	6	363	1.21457	73.4818
nsotho	20	383	4.04858	77.5304
ssotho	16	399	3.23887	80.7692
kikuyu	1	400	0.20243	80.9717
italian/: italian/eng	1	401	0.20243	81.1741
sotho	7	408	1.41700	82.5911
tswana	26	434	5.26316	87.8543
venda	2	436	0.40486	88.2591
sepedi	1	437	0.20243	88.4615
kiswahil: kiswahili	1	438	0.20243	88.6640
siswati	4	442	0.80972	89.4737
telagu	1	443	0.20243	89.6761
Error	1	444	0.20243	89.8785
portuguese	1	445	0.20243	90.0810
swati	1	446	0.20243	90.2834
swazi	2	448	0.40486	90.6883
ndebele	1	449	0.20243	90.8907
russian	2	451	0.40486	91.2955
yoruba	1	452	0.20243	91.4980
tshivenda	1	453	0.20243	91.7004
bemba	1	454	0.20243	91.9028
german	1	455	0.20243	92.1053
Missing	39	494	7.89474	100.0000

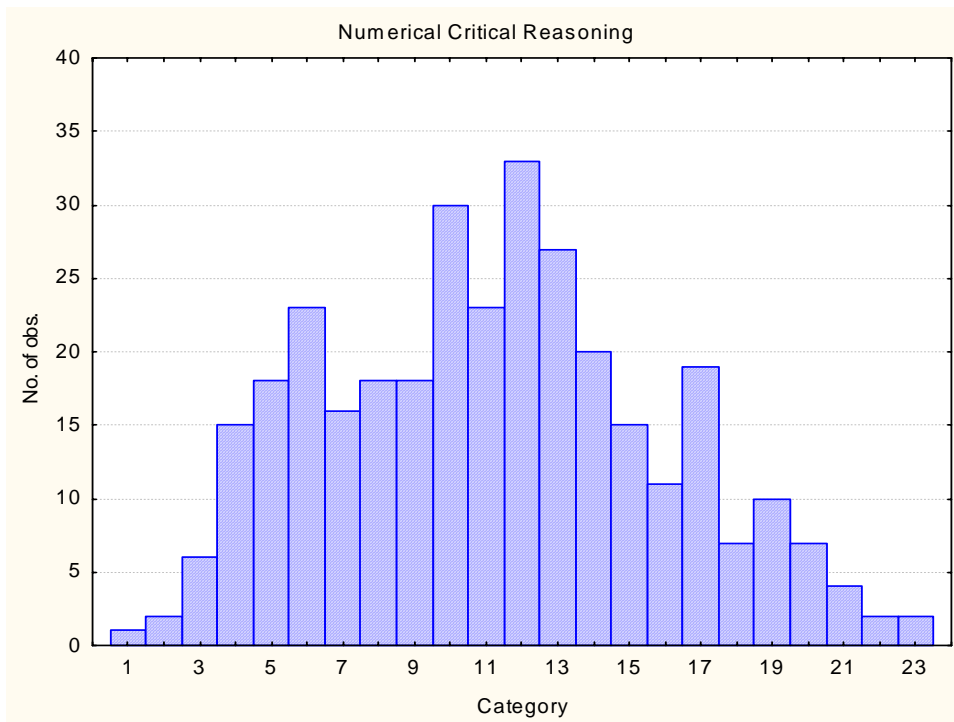
Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
AGE	32.55144	6.470267	20.00000	99.00000	486	8



Descriptive statistics on CRTB2 subtests

Variable	Descriptive Statistics					N	No.cases Missing
	Mean	Std.Dev	Minimum	Maximum			
Verbal Critical Reasoning	22.43668	6.513521	6.000000	37.000000	458	36	
Numerical Critical Reasoning	11.20183	4.670321	1.000000	23.000000	327	167	





Stanine table

	1 S9_1	2 S9_2	3 S9_3	4 S9_4	5 S9_5	6 S9_6	7 S9_7	8 S9_8	9 S9_9
Verbal Critical Reasoning	0-11	12-14	15-17	18-20	21-24	25-27	28-30	31-33	34-40
Numerical Critical Reasoning	0-3	4-5	6-7	8-10	11-12	13-14	15-17	18-19	20-25

Sten table

	1 S10_1	2 S10_2	3 S10_3	4 S10_4	5 S10_5	6 S10_6	7 S10_7	8 S10_8	9 S10_9	10 S10_10
Verbal Critical Reasoning	0-9	10-12	13-15	16-19	20-22	23-25	26-28	29-32	33-35	36-40
Numerical Critical Reasoning	0-1	2-4	5-6	7-8	9-11	12-13	14-15	16-18	19-20	21-25

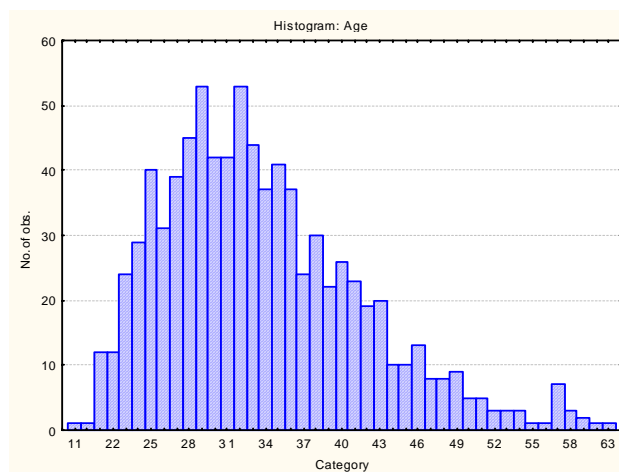
CRTB2 Norm group: SA General Population

Calculated from data submitted by various clients of Psytech SA. Data collected between 2000 and 2002. It should be borne in mind that the CRTB2 is only recommended for persons at managerial-graduate level, therefore this should not be considered a true population sample, rather a combination of various samples that were available.

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
Whites/coloureds	590	590	68.84481	68.8448
Asians	56	646	6.53442	75.3792
Blacks	208	854	24.27071	99.6499
Missing	3	857	0.35006	100.0000

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
Female	232	232	27.07118	27.0712
Male	620	852	72.34539	99.4166
Unknown	5	857	0.58343	100.0000
Missing	0	857	0.00000	100.0000

Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	33.70476	7.895381	11.00000	63.00000	840	17



Descriptive statistics on CRTB2 subtests

Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Numerical Critical Reasoning	8.96945	6.011480	0.00	24.00000	851	6
Verbal Critical Reasoning	19.75352	7.124892	0.00	37.00000	852	5

Stanine table

	1	2	3	4	5	6	7	8	9
	S9_1	S9_2	S9_3	S9_4	S9_5	S9_6	S9_7	S9_8	S9_9
Numerical Critical Reasoning	0-1	0-1	2-4	5-7	8-10	11-13	14-16	17-19	20-25
Verbal Critical Reasoning	0-7	8-10	11-14	15-17	18-21	22-25	26-28	29-32	33-40

CRTB2 Norm group: SA Insurance sales consultants

Sample composition

Insurance sales consultants employed in a major South African insurance company, tested as part of a validation exercise.

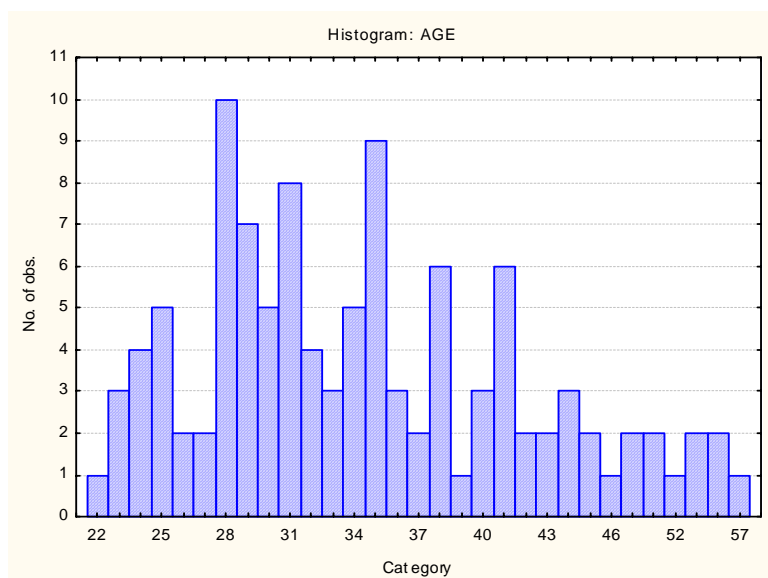
Respondents had a minimum education of grade 12, and also had special training specific to the insurance industry.

Data were collected in 2001-2002.

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
Whites/coloureds	85	85	77.27273	77.2727
Asians	7	92	6.36364	83.6364
Blacks	18	110	16.36364	100.0000
Missing	0	110	0.00000	100.0000

Category	Frequency table: GENDER			
	Count	Cumulative Count	Percent	Cumulative Percent
Female	18	18	16.36364	16.3636
Male	91	109	82.72727	99.0909
Unknown	1	110	0.90909	100.0000
Missing	0	110	0.00000	100.0000

Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
AGE	34.74312	8.135887	22.00000	57.00000	109	1



Descriptive statistics on CRTB2 subtests

Subtest	Sample	Mean	SD
Numerical Critical Reasoning	110	10.88	4.90
Verbal Critical Reasoning	110	18.71	7.10

Stanine table

	1	2	3	4	5	6	7	8	9
	S9_1	S9_2	S9_3	S9_4	S9_5	S9_6	S9_7	S9_8	S9_9
Numerical Critical Reasoning	0-2	3-4	5-7	8-9	10-12	13-14	15-17	18-19	20-25
Verbal Critical Reasoning	0-6	7-9	10-13	14-16	17-20	21-24	25-27	28-31	32-40

CRTB2 Norm group: SA Managers and graduates

Sample composition:

Clients tested by Psytech SA and its clients for managerial positions that require a tertiary qualification.

Descriptive statistics on CRTB2 subtests

Dim	Sample Size	Mean	SD
Numerical Critical Reasoning	121	11.01	4.72
Verbal Critical Reasoning	121	22.65	6.75

Stanine table

	1	2	3	4	5	6	7	8	9
	S9_1	S9_2	S9_3	S9_4	S9_5	S9_6	S9_7	S9_8	S9_9
Numerical Critical Reasoning	0-2	3-5	6-7	8-9	10-12	13-14	15-16	17-19	20-25
Verbal Critical Reasoning	0-10	11-14	15-17	18-20	21-24	25-27	28-31	32-34	35-40

CRTB2 Norm group: SA General Population updated 2008

Sample composition:

Data were collected by Psytech SA and collaborators between 2001 and 2008.

Not all respondents completed all the tests, therefore biographical data are reported separately for the Verbal Critical Reasoning Test and the Numerical Critical Reasoning Test.

Sample composition for Verbal Critical Reasoning Test

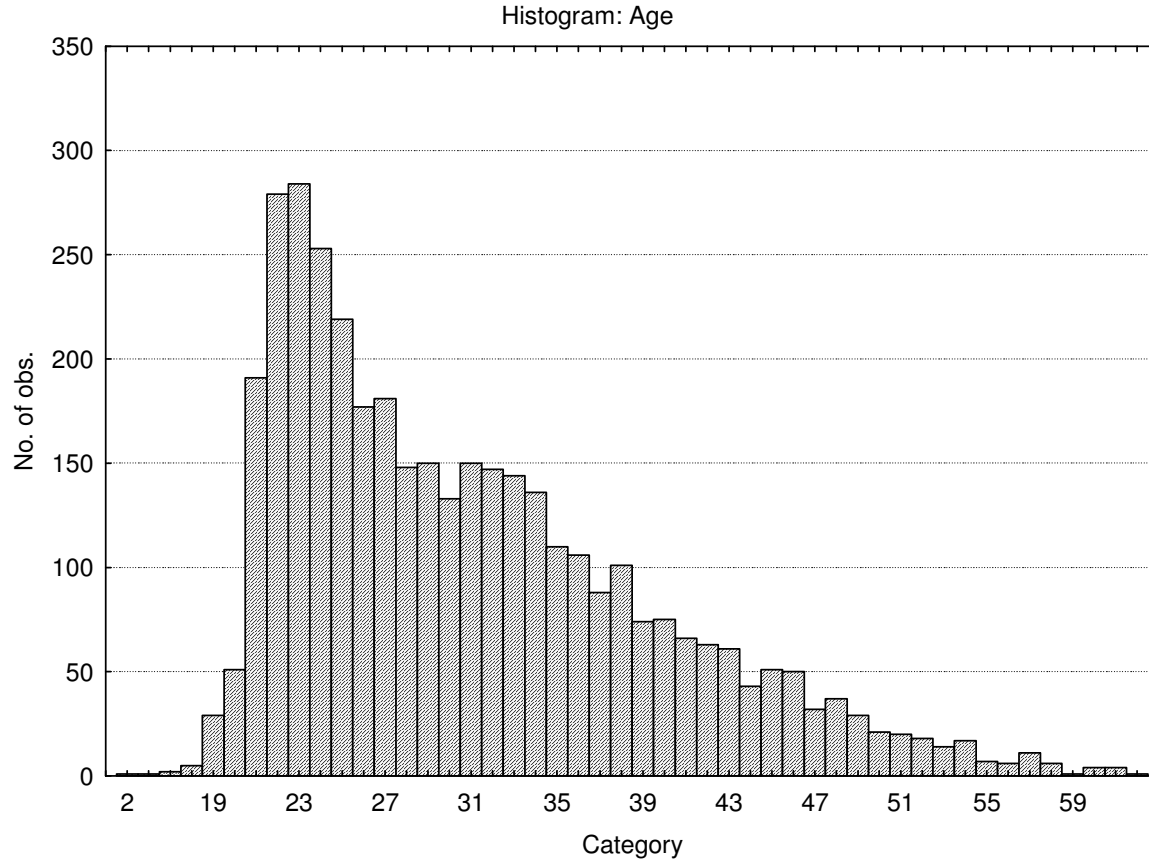
Category	Frequency table: Sex			
	Count	Cumulative	Percent	Cumulative
M	2672	2672	67.52590	67.5259
F	1263	3935	31.91812	99.4440
U	22	3957	0.55598	100.0000
Missing	0	3957	0.00000	100.0000

Category	Frequency table: Education			
	Count	Cumulative	Percent	Cumulative
Post Graduate	583	583	14.73338	14.7334
Technikon	437	1020	11.04372	25.7771
Grade 12	441	1461	11.14481	36.9219
Degree	800	2261	20.21734	57.1392
University diploma	321	2582	8.11221	65.2515
Vocational Training	84	2666	2.12282	67.3743
Grade 10 or 11	22	2688	0.55598	67.9303
Missing	1269	3957	32.06975	100.0000

Category	Frequency table: Language			
	Count	Cumulative	Percent	Cumulative
English	1156	1156	29.21405	29.2141
isiZulu	342	1498	8.64291	37.8570
Afrikaans	484	1982	12.23149	50.0885
Sesotho	178	2160	4.49836	54.5868
Setswana	131	2291	3.31059	57.8974
isiXhosa	240	2531	6.06520	63.9626
Sepedi	74	2605	1.87010	65.8327
Xitsonga	41	2646	1.03614	66.8688
Other	54	2700	1.36467	68.2335
siSwati	18	2718	0.45489	68.6884
Tshivenda	47	2765	1.18777	69.8762
isiNdebele	11	2776	0.27799	70.1542
Missing	1181	3957	29.84584	100.0000

Category	Frequency table: Race			
	Count	Cumulative	Percent	Cumulative
Asian	443	443	11.19535	11.1954
European	1065	1508	26.91433	38.1097
Coloured	127	1635	3.20950	41.3192
African	1236	2871	31.23578	72.5550
Missing	1086	3957	27.44503	100.0000

Variable	Descriptive Statistics : Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases
Age	30.92441	8.516508	2.000000	63.00000	3797	160



Sample composition: Numerical Critical Reasoning Test

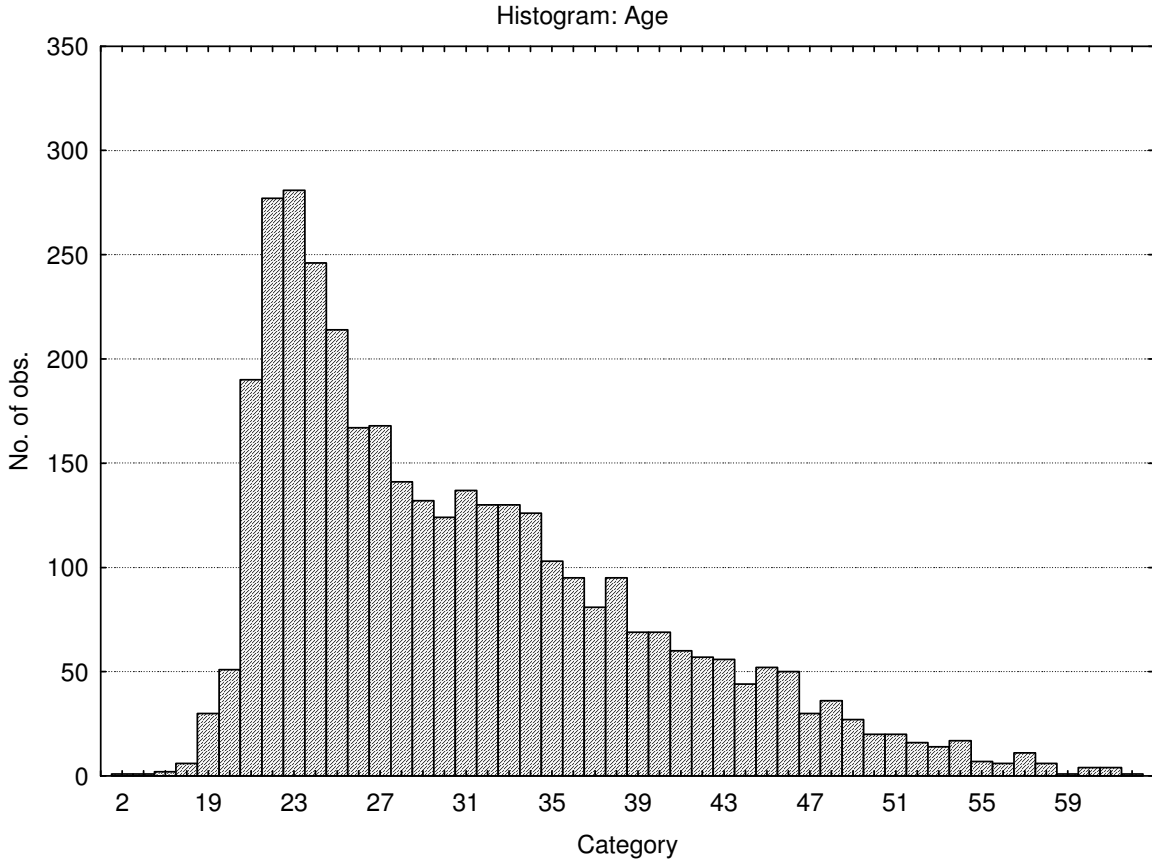
Category	Frequency table: Sex			
	Count	Cumulative	Percent	Cumulative
M	2534	2534	67.50133	67.5013
F	1201	3735	31.99254	99.4939
U	19	3754	0.50613	100.0000
Missing	0	3754	0.00000	100.0000

Category	Frequency table: Education			
	Count	Cumulative	Percent	Cumulative
Post Graduate	541	541	14.41129	14.4113
Technikon	430	971	11.45445	25.8657
Grade 12	447	1418	11.90730	37.7730
Degree	764	2182	20.35162	58.1247
University diploma	313	2495	8.33777	66.4624
Vocational Training	86	2581	2.29089	68.7533
Grade 10 or 11	22	2603	0.58604	69.3394
Missing	1151	3754	30.66063	100.0000

Category	Frequency table: Language			
	Count	Cumulative	Percent	Cumulative
English	1127	1127	30.02131	30.0213
isiZulu	342	1469	9.11028	39.1316
Afrikaans	453	1922	12.06713	51.1987
Sesotho	176	2098	4.68833	55.8871
Setswana	130	2228	3.46297	59.3500
isiXhosa	239	2467	6.36654	65.7166
Sepedi	73	2540	1.94459	67.6612
Xitsonga	41	2581	1.09217	68.7533
Other	51	2632	1.35855	70.1119
siSwati	17	2649	0.45285	70.5647
Tshivenda	45	2694	1.19872	71.7635
isiNdebele	11	2705	0.29302	72.0565
Missing	1049	3754	27.94353	100.0000

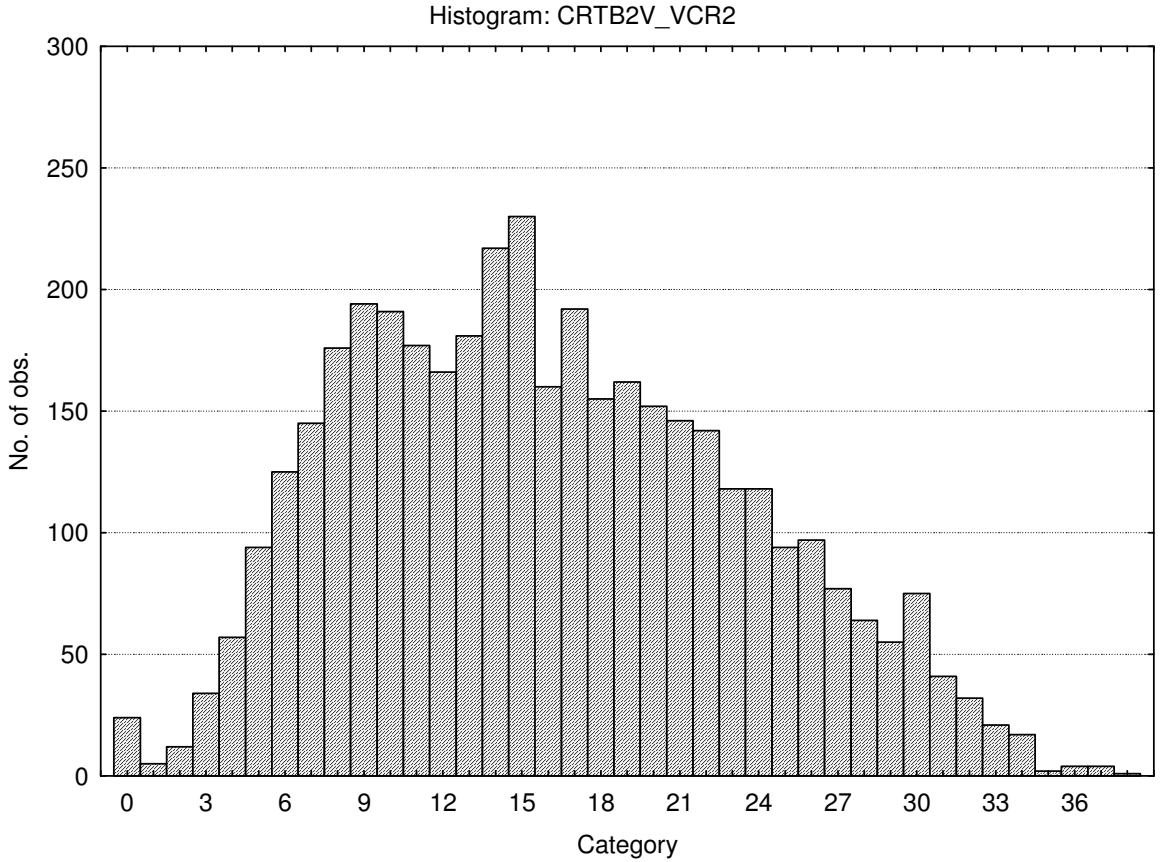
Category	Frequency table: Race			
	Count	Cumulative	Percent	Cumulative
Asian	433	433	11.53436	11.5344
European	1015	1448	27.03783	38.5722
Coloured	127	1575	3.38306	41.9552
African	1224	2799	32.60522	74.5605
Missing	955	3754	25.43953	100.0000

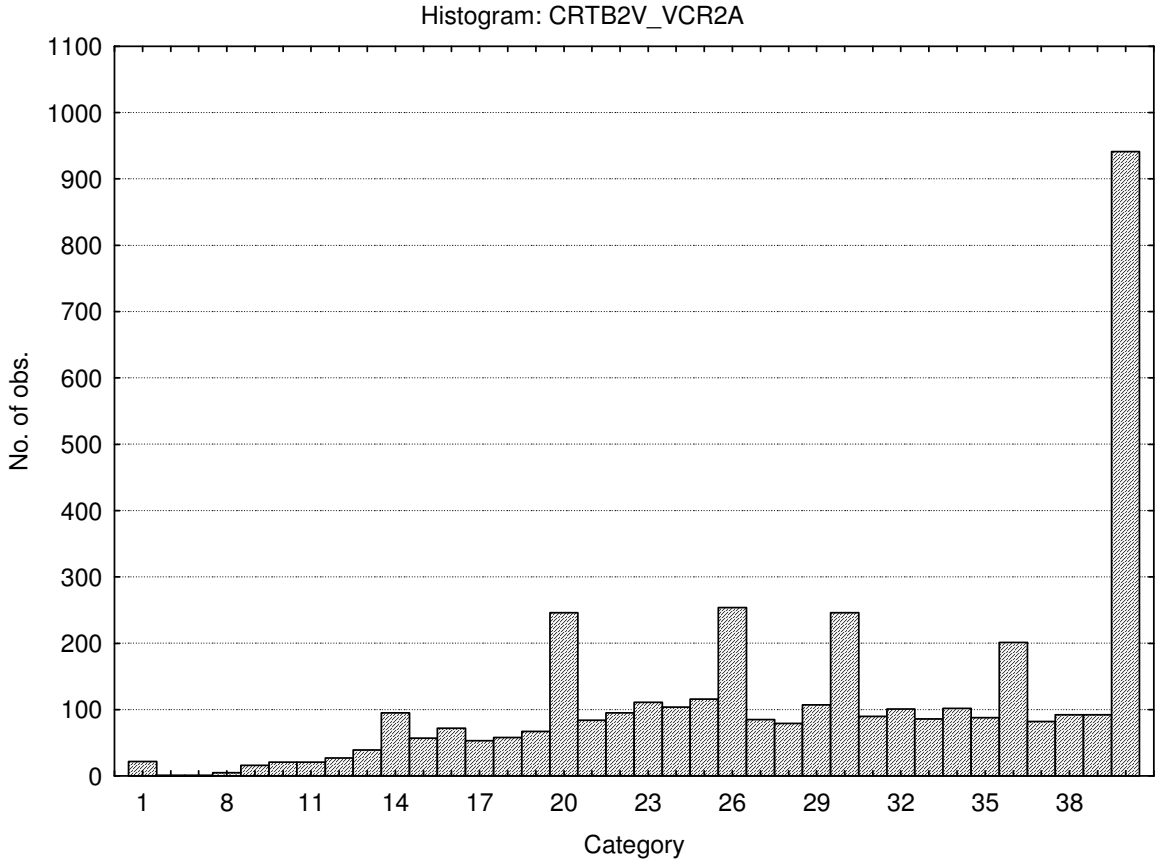
Variable	Descriptive Statistics : Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases
Age	30.81859	8.618331	2.000000	63.00000	3605	149



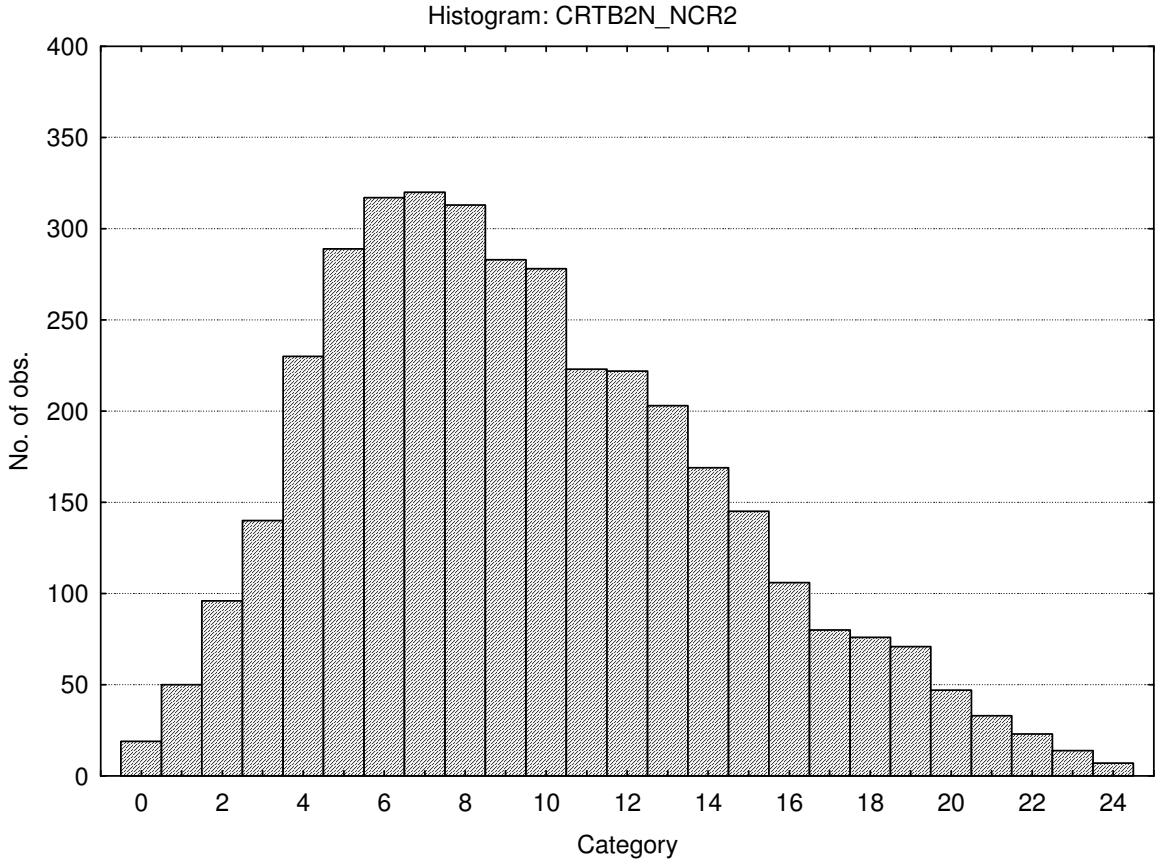
Descriptive statistics on CRTB2 subtests

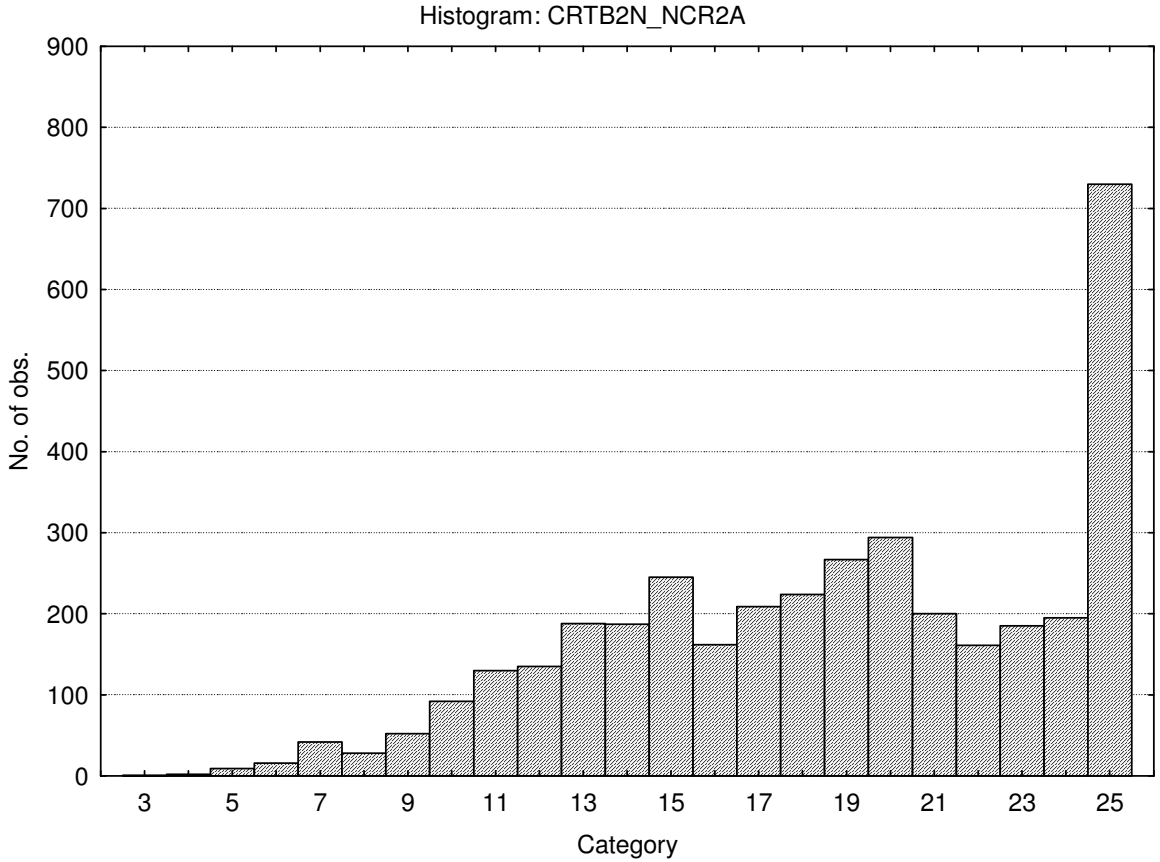
Variable	Descriptive Statistics : Verbal Critical Reasoning Test					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases missing
Verbal Critical Reasoning	16.03740	7.403687	0.000000	38.00000	3957	0
Verbal Critical Reasoning Items Attempted	29.50847	8.985622	1.000000	40.00000	3957	0





Variable	Descriptive Statistics: Numerical Critical Reasoning					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases missing
Numerical Critical Reasoning	9.50959	4.798197	0.000000	24.00000	3754	0
Numerical Critical Reasoning Items Attempted	18.62067	5.062778	3.000000	25.00000	3754	0





Stanine table

	S9_1	S9_2	S9_3	S9_4	S9_5	S9_6	S9_7	S9_8	S9_9
Verbal Critical Reasoning	0-3	4-6	7-10	11-14	15-17	18-21	22-25	26-28	29-40
Numerical Critical Reasoning	0--1	0-0	1-3	4-7	8-11	12-15	16-19	20-23	24-25

SA General Population 2002 to 2006

Sample composition

Respondents tested by Psytech SA and its clients between the period of 1 January 2002 to July 2006. Norms were recalculated on updated data, discarding older data from the period when the test may not have been used appropriately. This is in line with the principle of updating norms regularly.

For Numerical Critical Reasoning

Age			
Mean	Min	Max	Missing
30.01	19	57	67

Sex		
Male	Female	Missing
508	206	9

Education		
Grade 10 or 11	2	
Grade 12	97	
University entrance matric	0	
Vocational Training	47	
Technikon	28	
University diploma	51	
Degree	199	
Post Graduate	110	
Missing	155	

First Language		
isiZulu	38	
isiXhosa	31	
Afrikaans	104	
Sepedi	11	
English	256	
Setswana	24	
Sesotho	32	
Xitsonga	6	
siSwati	4	
isiNdebele	2	
Tshivenda	8	
Other	30	
Missing	157	

Race		
Asian	109	
African	215	
Coloured	34	
European	231	
Other	2	
Missing	130	

For Verbal Critical Reasoning

Age			
Mean	Min	Max	Missing
30.14	19	57	69

Sex		
Male	Female	Missing
513	203	9

Education		
Grade 10 or 11	3	
Grade 12	88	
University entrance matric	0	
Vocational Training	47	
Technikon	31	
University diploma	52	
Degree	201	
Post Graduate	112	
Missing	157	

First Language		
isiZulu	37	
isiXhosa	30	
Afrikaans	109	
Sepedi	11	
English	255	
Setswana	21	
Sesotho	32	
Xitsonga	6	
siSwati	4	
isiNdebele	2	
Tshivenda	8	
Other	31	
Missing	159	

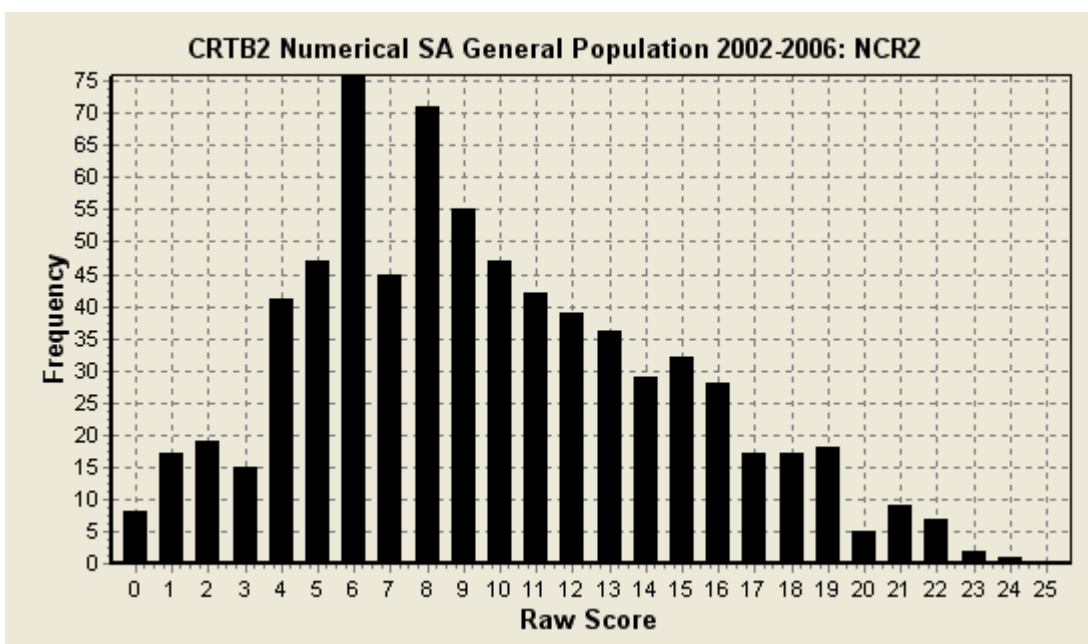
Race		
Asian	108	
African	212	
Coloured	33	
European	236	
Other	2	
Missing	132	

Descriptive statistics on CRTB2 subtests

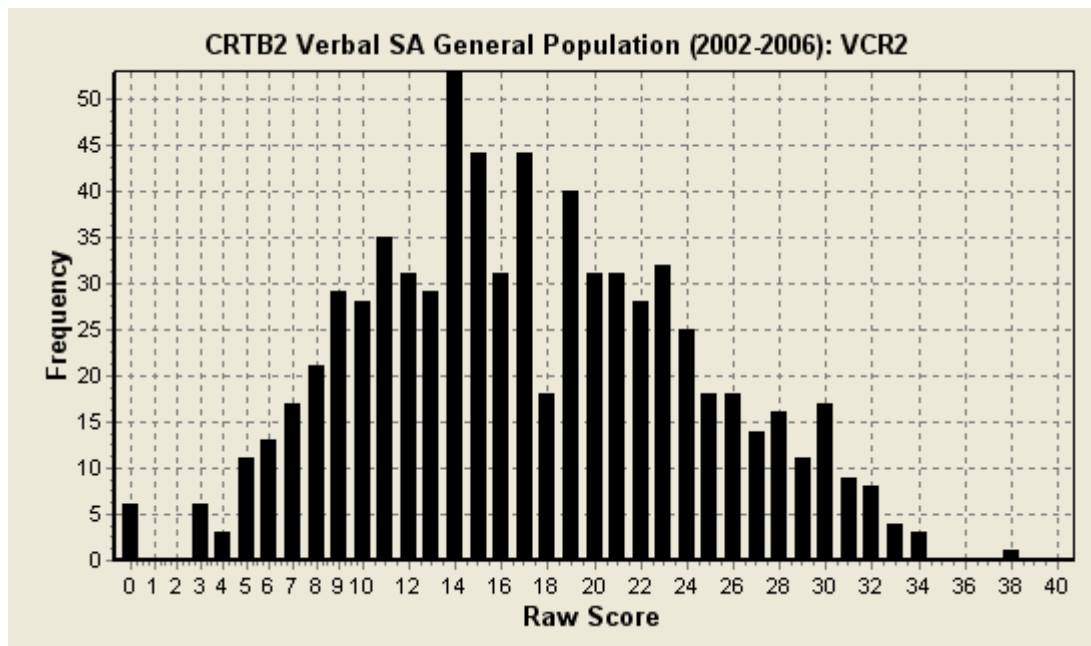
	Sample Size	Mean	SD
Numerical Critical Reasoning	723	9.66	4.99
Verbal Critical Reasoning	725	17.18	7.12

Frequency distribution of scores

Numerical Critical Reasoning



Verbal Critical Reasoning



Stanine tables

	1	2	3	4	5	6	7	8	9
Numerical Critical Reasoning	0-1	2-3	4-5	6-7	8-10	11-13	14-16	17-19	20-25
Verbal Critical Reasoning	0-14	15-19	20-24	25-29	30-35	36-39	40		

Sten table

	1	2	3	4	5	6	7	8	9	10
Numerical Critical Reasoning	0	1-2	3-4	5-6	7-8	9-11	12-15	16-18	19-20	21-25
Verbal Critical Reasoning	0-4	5-7	8-9	10-13	14-16	17-20	21-24	25-28	29-31	32-40

Comments on this norm group

The more recent norm has a more normal distribution. It appears that the test battery is now used more appropriately. It is recommended that users should choose this norm group in preference to the older general population norm group.

Critical Reasoning Test Battery norm group: South Africans of African race, updated 2010

Sample composition

The sample consisted of South Africans of African race, tested by Psytech South Africa and collaborators during the period leading up to January 2010. Because not all respondents completed both the Verbal and Numerical Critical Reasoning Tests, the statistics are reported separately for the two tests.

Sample composition: Numerical Critical Reasoning Test

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	809	809	60.55389	60.5539
F	524	1333	39.22156	99.7754
U	3	1336	0.22455	100.0000
Missing	0	1336	0.00000	100.0000

Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	214	214	16.01796	16.0180
Diploma	471	685	35.25449	51.2725
Grade 12	101	786	7.55988	58.8323
Degree	382	1168	28.59281	87.4251
<Grade 12	4	1172	0.29940	87.7246
Vocational Training	21	1193	1.57186	89.2964
Missing	143	1336	10.70359	100.0000

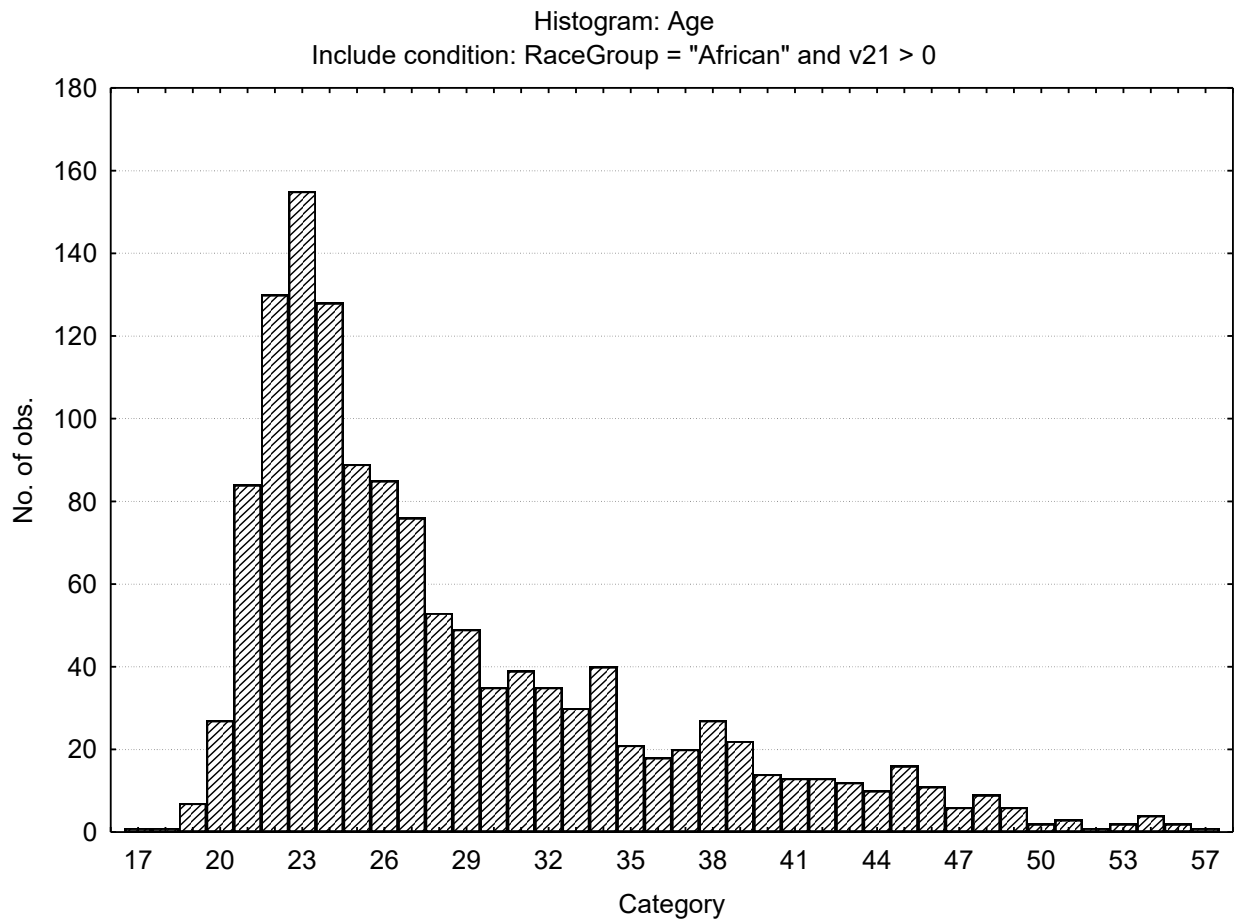
Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
English	56	56	4.19162	4.1916
Setswana	144	200	10.77844	14.9701
Afrikaans	5	205	0.37425	15.3443
isiZulu	359	564	26.87126	42.2156
Xitsonga	44	608	3.29341	45.5090

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
isiXhosa	272	880	20.35928	65.8683
Sepedi	74	954	5.53892	71.4072
Tshivenda	45	999	3.36826	74.7754
isiNdebele	11	1010	0.82335	75.5988
siSwati	18	1028	1.34731	76.9461
Sesotho	179	1207	13.39820	90.3443
Missing	129	1336	9.65569	100.0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
English	56	56	4.19162	4.1916
Indigenous	1146	1202	85.77844	89.9701
Afrikaans	5	1207	0.37425	90.3443
Missing	129	1336	9.65569	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
African	1336	1336	100.0000	100.0000
Missing	0	1336	0.0000	100.0000

Variable	Descriptive Statistics: Age					No.cases Missing
	Mean	Std.Dev	Minimum	Maximum	N	
Age	28.31149	7.285204	17.00000	57.00000	1297	39



Sample composition: Verbal Critical Reasoning Test

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	811	811	60.61286	60.6129
F	524	1335	39.16293	99.7758
U	3	1338	0.22422	100.0000
Missing	0	1338	0.00000	100.0000

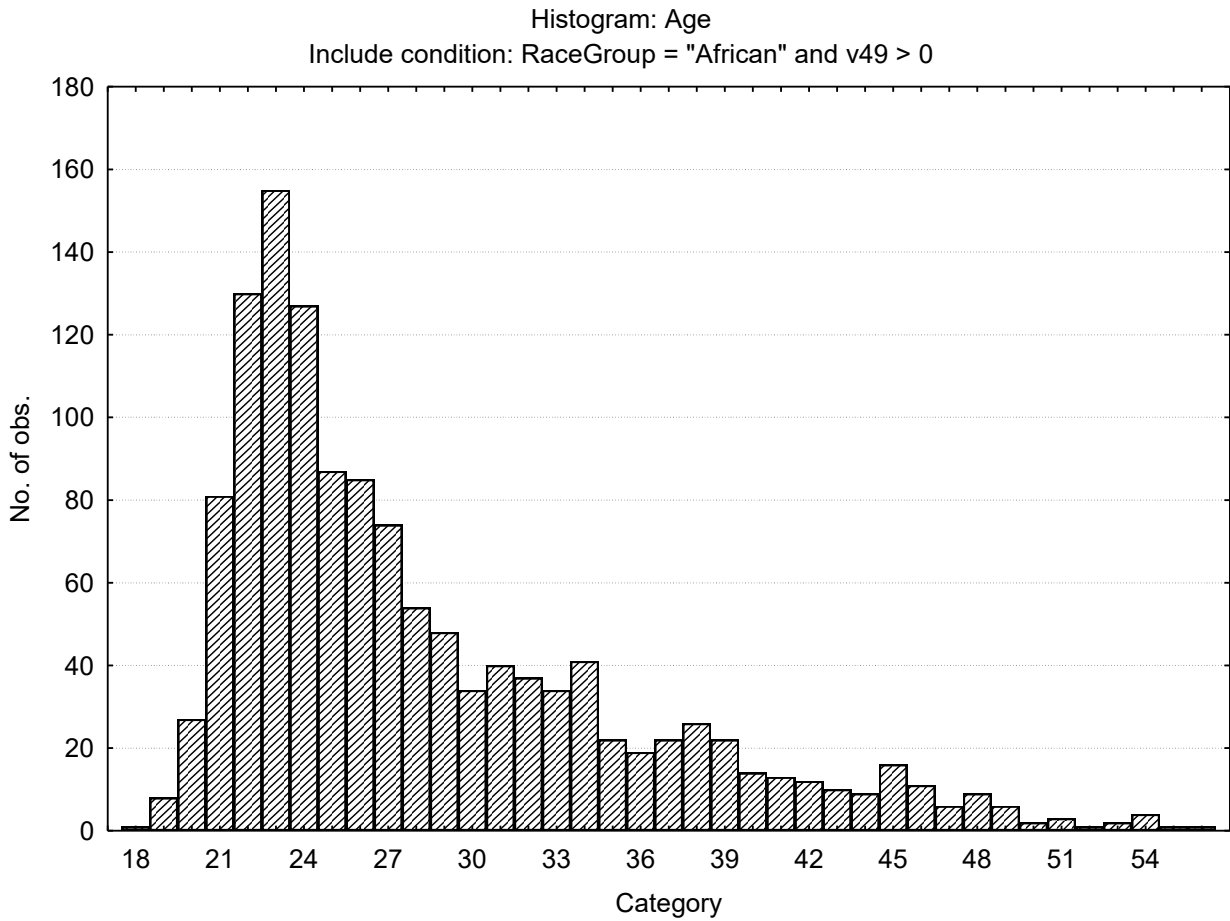
Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	228	228	17.04036	17.0404
Diploma	464	692	34.67862	51.7190
Grade 12	97	789	7.24963	58.9686
Degree	392	1181	29.29746	88.2661
<Grade 12	3	1184	0.22422	88.4903
Vocational Training	18	1202	1.34529	89.8356
Missing	136	1338	10.16442	100.0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
English	57	57	4.26009	4.2601
Setswana	146	203	10.91181	15.1719
Afrikaans	7	210	0.52317	15.6951
isiZulu	353	563	26.38266	42.0777
Xitsonga	43	606	3.21375	45.2915
isiXhosa	270	876	20.17937	65.4709
Sepedi	76	952	5.68012	71.1510
Tshivenda	47	999	3.51271	74.6637
isiNdebele	10	1009	0.74738	75.4111
siSwati	19	1028	1.42003	76.8311
Sesotho	178	1206	13.30344	90.1345
Missing	132	1338	9.86547	100.0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
English	57	57	4.26009	4.2601
Indigenous	1142	1199	85.35127	89.6114
Afrikaans	7	1206	0.52317	90.1345
Missing	132	1338	9.86547	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
African	1338	1338	100.0000	100.0000
Missing	0	1338	0.0000	100.0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	28.31607	7.213125	18.00000	57.00000	1294	44



Descriptive statistics on Critical Reasoning Test Battery scales

Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Numerical Critical Reasoning	6.51871	3.325031	0.000000	22.00000	1336	0
Numerical Critical Reasoning items attempted	17.29341	5.281228	4.000000	25.00000	1336	0
Verbal Critical Reasoning	11.29447	5.353473	0.000000	31.00000	1338	0
Verbal Critical Reasoning items attempted	26.00448	8.586311	6.000000	40.00000	1338	0

Stanine table

	S9_1	S9_2	S9_3	S9_4	S9_5	S9_6	S9_7	S9_8	S9_9
NCR2 Numerical Critical Reasoning	0-0	1-2	3-4	5-5	6-7	8-9	10-10	11-12	13-22
NCR2 Items Attempted	4-8	9-10	11-13	14-15	16-18	19-21	22-23	24-25	
VCR2 Verbal Critical Reasoning	0-1	2-4	5-7	8-9	10-12	13-15	16-17	18-20	21-31
VCR2 Items Attempted	6-10	11-15	16-19	20-23	24-28	29-32	33-36	37-40	

Critical Reasoning Test Battery Norm Group: South Africans, race Coloured, updated 2010

Sample composition

The sample consisted of South Africans, who declared their race group as being Coloured, tested by Psytech SA and collaborators in the period leading up to January 2010. Not all respondents completed both the Verbal and Numerical Critical Reasoning Test, therefore the biographical details are reported separately for the persons who completed the Numerical and Verbal Critical Reasoning Tests respectively.

Sample composition: Numerical Critical Reasoning Test

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	91	91	67.40741	67.4074
F	43	134	31.85185	99.2593
U	1	135	0.74074	100.0000
Missing	0	135	0.00000	100.0000

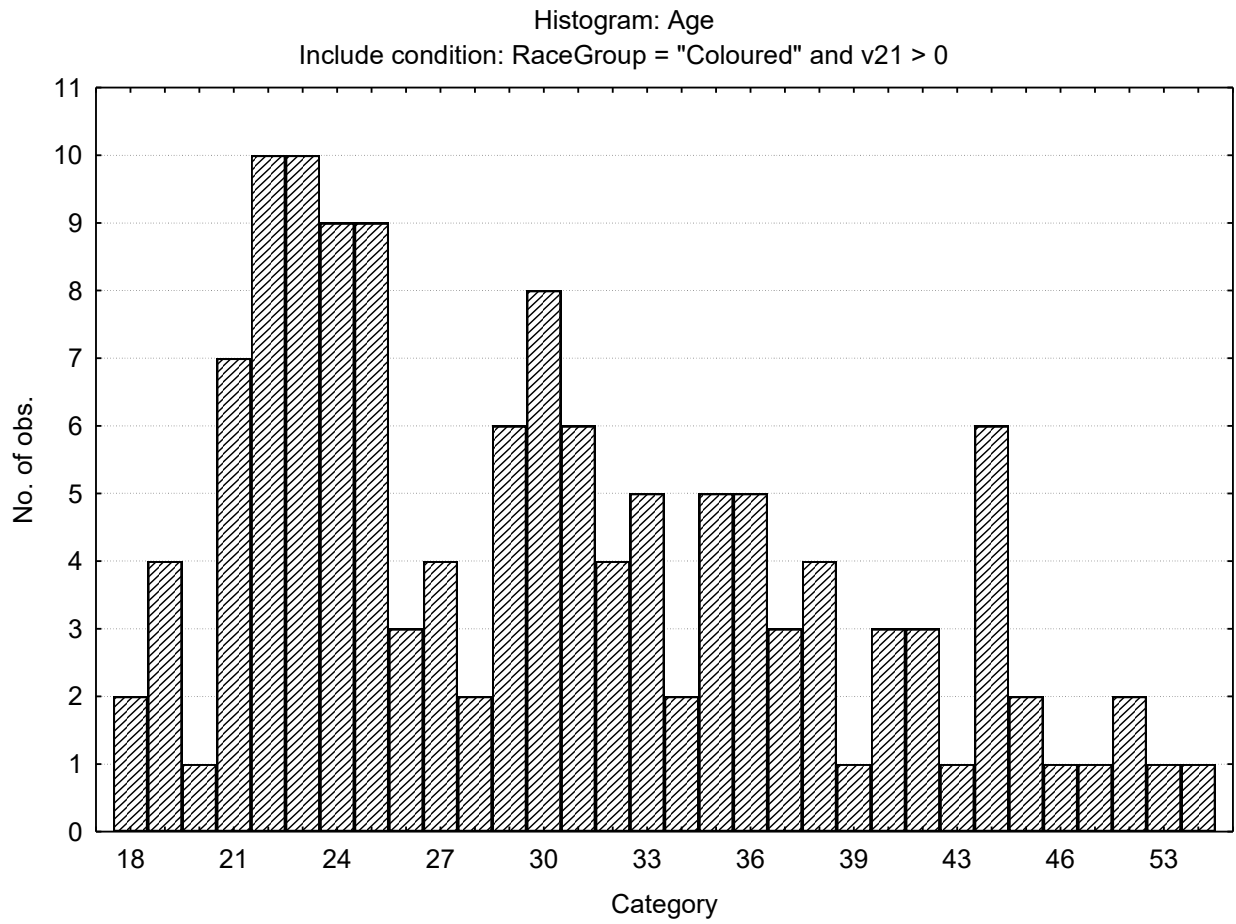
Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	16	16	11.85185	11.8519
Diploma	40	56	29.62963	41.4815
Grade 12	33	89	24.44444	65.9259
Degree	27	116	20.00000	85.9259
<Grade 12	1	117	0.74074	86.6667
Vocational Training	2	119	1.48148	88.1481
Missing	16	135	11.85185	100.0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
English	103	103	76.29630	76.2963
Afrikaans	26	129	19.25926	95.5556
Missing	6	135	4.44444	100.0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
English	103	103	76.29630	76.2963
Afrikaans	26	129	19.25926	95.5556
Missing	6	135	4.44444	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Coloured	135	135	100.0000	100.0000
Missing	0	135	0.0000	100.0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	30.29771	8.321145	18.00000	57.00000	131	4



Sample composition: Verbal Critical Reasoning Test

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	92	92	67.64706	67.6471
F	43	135	31.61765	99.2647
U	1	136	0.73529	100.0000
Missing	0	136	0.00000	100.0000

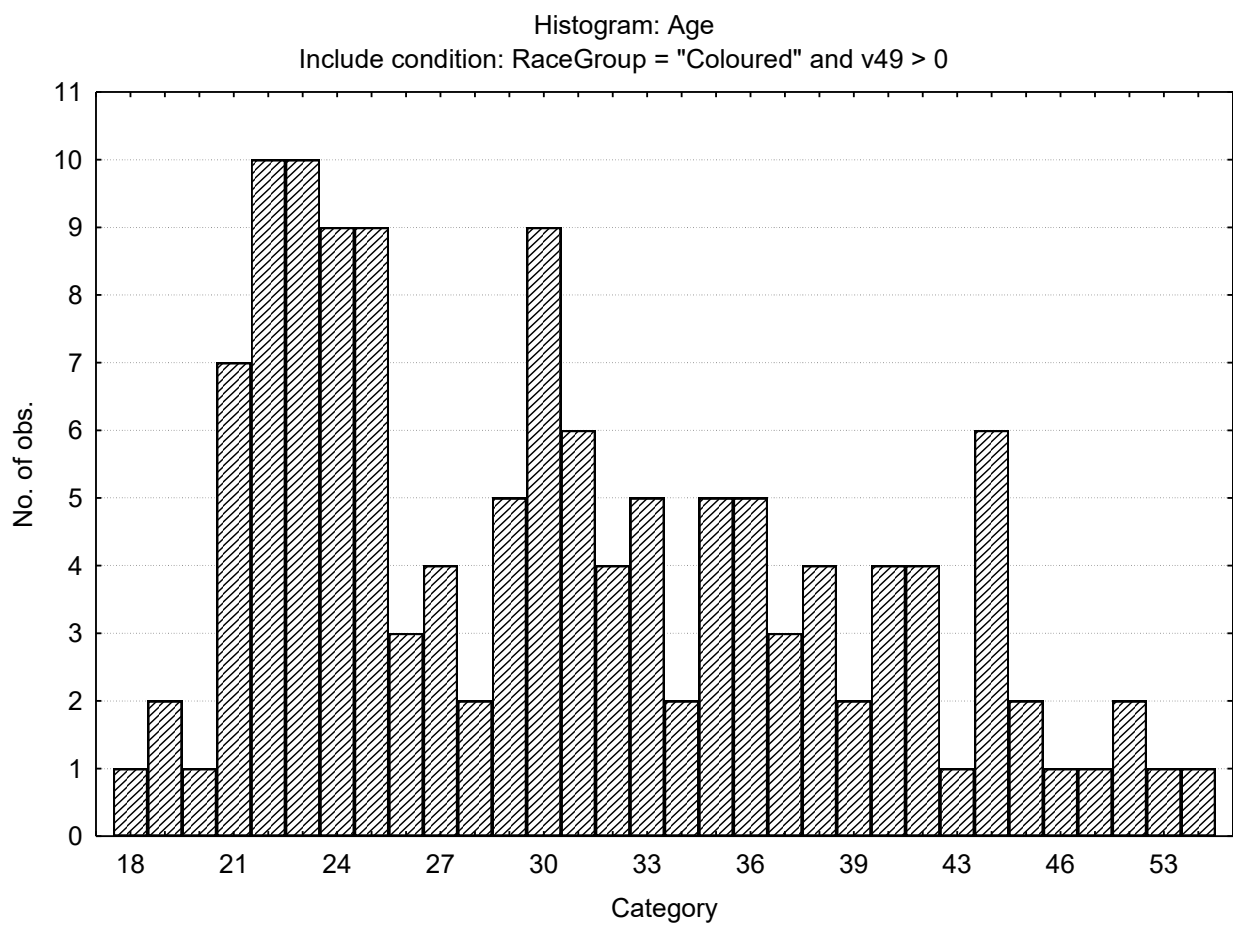
Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	16	16	11.76471	11.7647
Diploma	41	57	30.14706	41.9118
Grade 12	29	86	21.32353	63.2353
Degree	29	115	21.32353	84.5588
<Grade 12	2	117	1.47059	86.0294
Vocational Training	3	120	2.20588	88.2353
Missing	16	136	11.76471	100.0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
English	104	104	76.47059	76.4706
Afrikaans	25	129	18.38235	94.8529
isiXhosa	1	130	0.73529	95.5882
Missing	6	136	4.41176	100.0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
English	104	104	76.47059	76.4706
Indigenous	1	105	0.73529	77.2059
Afrikaans	25	130	18.38235	95.5882
Missing	6	136	4.41176	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Coloured	136	136	100.0000	100.0000
Missing	0	136	0.0000	100.0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	30.79389	8.248746	18.00000	57.00000	131	5



Descriptive statistics on Critical Reasoning Test Battery scales

Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Numerical Critical Reasoning	8.69630	4.492571	0.000000	22.00000	135	0
Numerical Critical Reasoning Items Attempted	18.28889	5.462035	3.000000	25.00000	135	0
Verbal Critical Reasoning	14.92647	6.480320	4.00000	37.00000	136	0
Verbal Critical Reasoning Items Attempted	28.77206	8.570377	10.00000	40.00000	136	0

Stanine table

	S9_1	S9_2	S9_3	S9_4	S9_5	S9_6	S9_7	S9_8	S9_9
NCR2 Numerical Critical Reasoning	0-0	1-3	4-5	6-7	8-9	10-12	13-14	15-16	17-22
NCR2 Items Attempted	3-8	9-11	12-14	15-16	17-19	20-22	23-25		
VCR2 Verbal Critical Reasoning	4-3	4-6	7-10	11-13	14-16	17-19	20-23	24-26	27-37
VCR2 Items Attempted	10-13	14-18	19-22	23-26	27-30	31-35	36-39	40-40	

Critical Reasoning Test Battery Norm Group: South Africans, European Race, updated 2010

Sample composition

The sample consisted of South Africans who described their race as European, tested by Psytech South Africa and collaborators during the period leading up to January 2010. Not all respondents completed both subtests in the Critical Reasoning Test Battery, therefore biographical particulars are reported separately for the Numerical Critical Reasoning Test and the Verbal Critical Reasoning Test,

Sample composition: Numerical Critical Reasoning Test Battery

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	706	706	69.48819	69.4882
F	306	1012	30.11811	99.6063
U	4	1016	0.39370	100.0000
Missing	0	1016	0.00000	100.0000

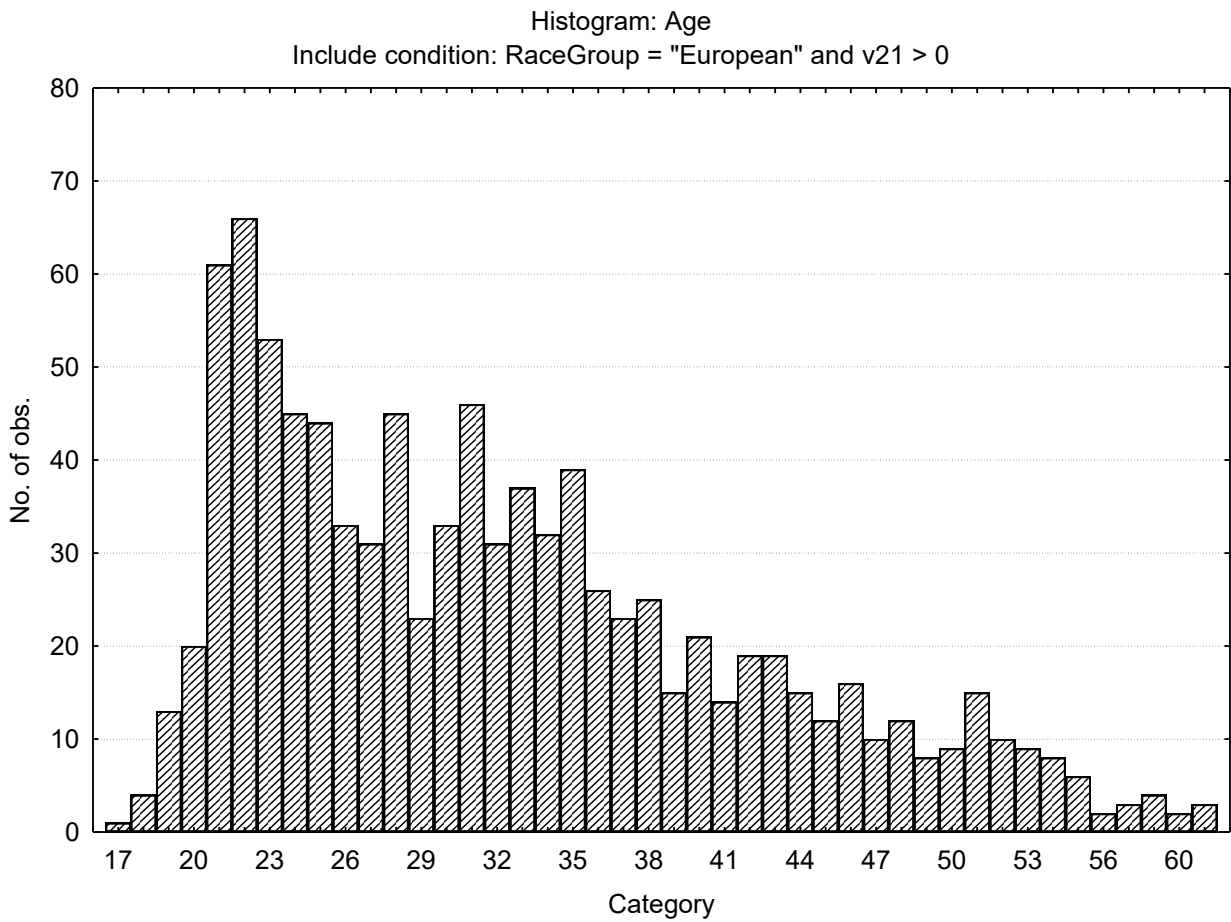
Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	176	176	17.32283	17.3228
Diploma	186	362	18.30709	35.6299
Grade 12	226	588	22.24409	57.8740
Degree	235	823	23.12992	81.0039
<Grade 12	15	838	1.47638	82.4803
Vocational Training	25	863	2.46063	84.9409
Missing	153	1016	15.05906	100.0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
English	553	553	54.42913	54.4291
Afrikaans	418	971	41.14173	95.5709
isiXhosa	2	973	0.19685	95.7677
Sepedi	1	974	0.09843	95.8661
siSwati	1	975	0.09843	95.9646
Missing	41	1016	4.03543	100.0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
English	553	553	54.42913	54.4291
Indigenous	4	557	0.39370	54.8228
Afrikaans	418	975	41.14173	95.9646
Missing	41	1016	4.03543	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
European	1016	1016	100.0000	100.0000
Missing	0	1016	0.0000	100.0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	32.28660	9.699588	17.00000	62.00000	963	53



Sample composition: Verbal Critical Reasoning Test

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	740	740	69.48357	69.4836
F	321	1061	30.14085	99.6244
U	4	1065	0.37559	100.0000
Missing	0	1065	0.00000	100.0000

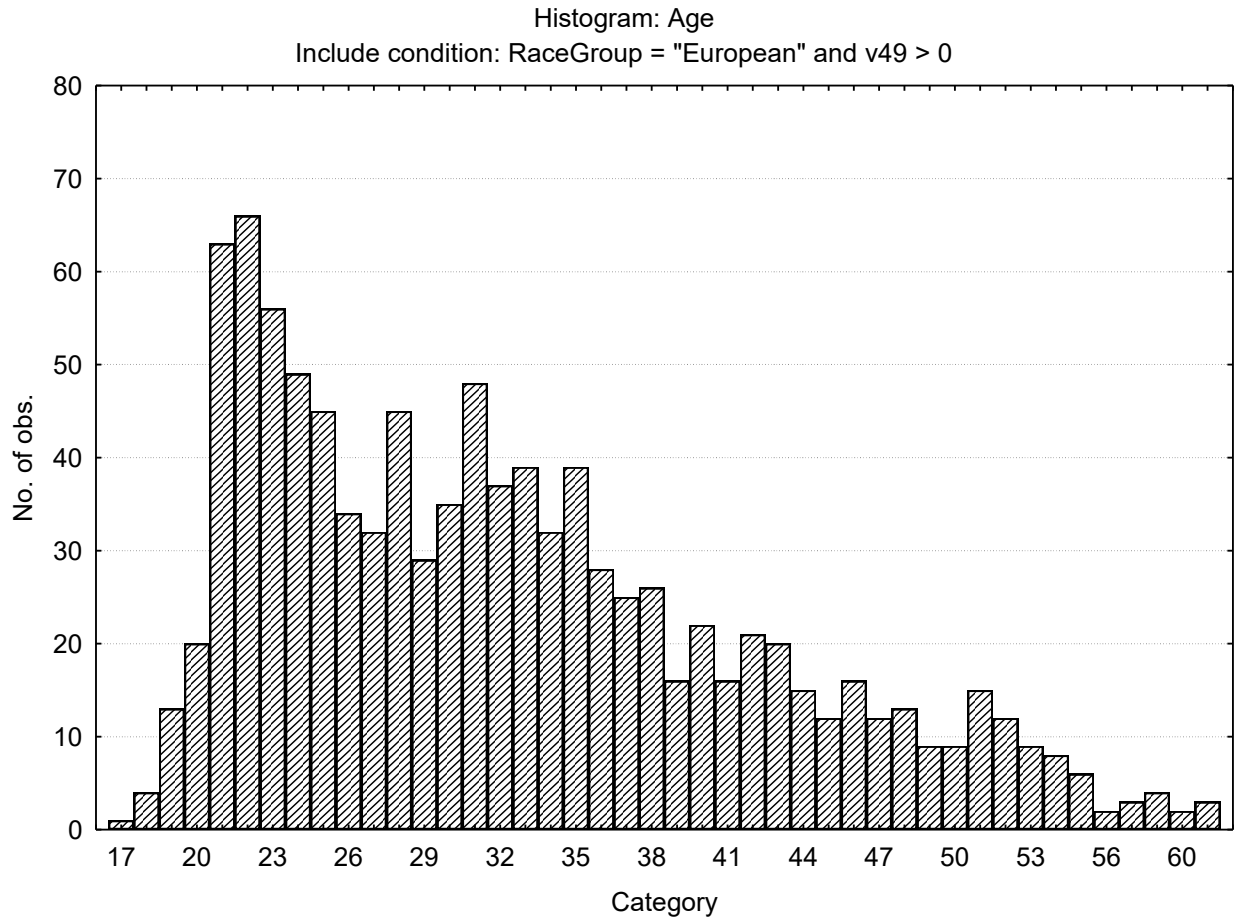
Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	197	197	18.49765	18.4977
Diploma	198	395	18.59155	37.0892
Grade 12	226	621	21.22066	58.3099
Degree	254	875	23.84977	82.1596
<Grade 12	14	889	1.31455	83.4742
Vocational Training	25	914	2.34742	85.8216
Missing	151	1065	14.17840	100.0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
English	571	571	53.61502	53.6150
Afrikaans	448	1019	42.06573	95.6808
isiXhosa	2	1021	0.18779	95.8685
Sepedi	1	1022	0.09390	95.9624
siSwati	1	1023	0.09390	96.0563
Missing	42	1065	3.94366	100.0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
English	571	571	53.61502	53.6150
Indigenous	4	575	0.37559	53.9906
Afrikaans	448	1023	42.06573	96.0563
Missing	42	1065	3.94366	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
European	1065	1065	100.0000	100.0000
Missing	0	1065	0.0000	100.0000

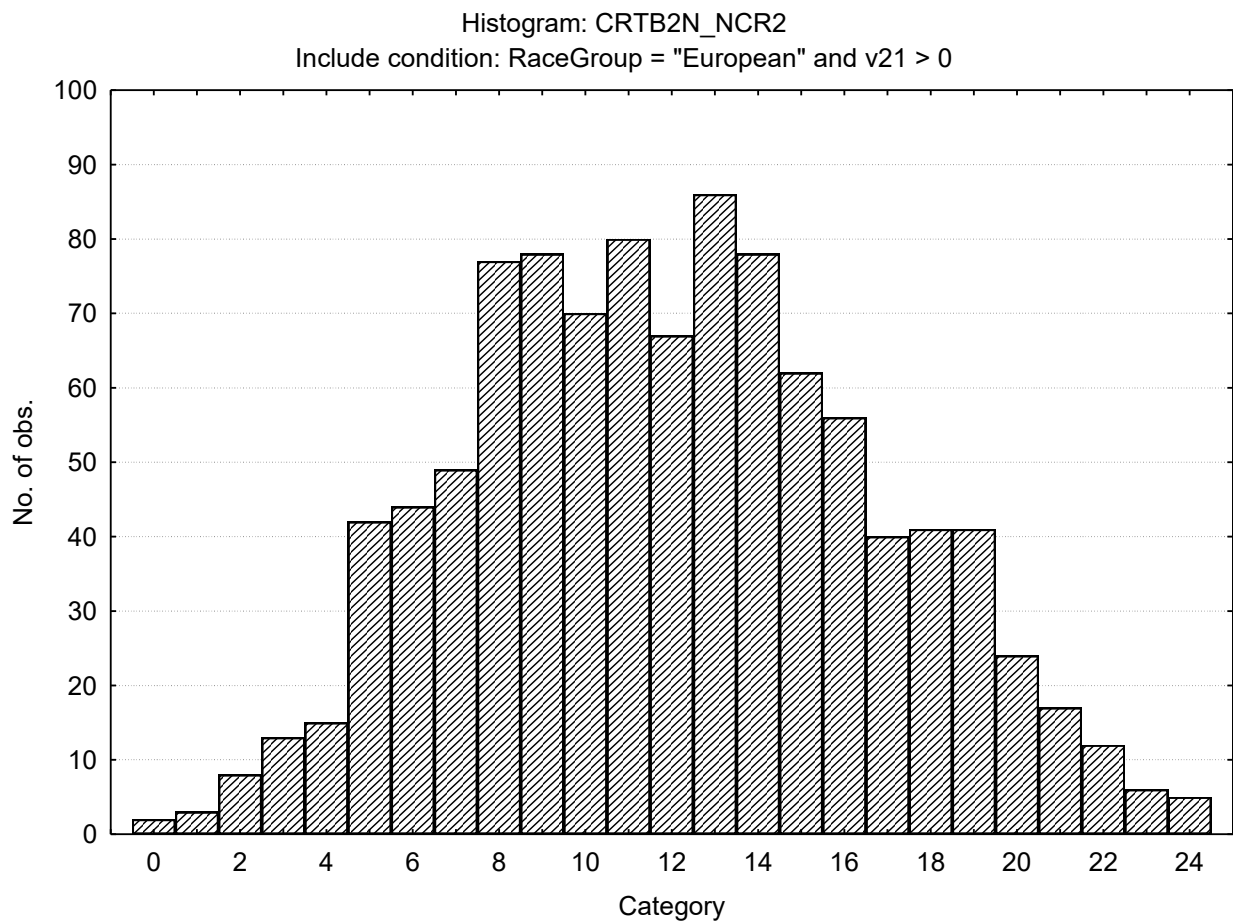
Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	32.34224	9.641781	17.00000	62.00000	1011	54



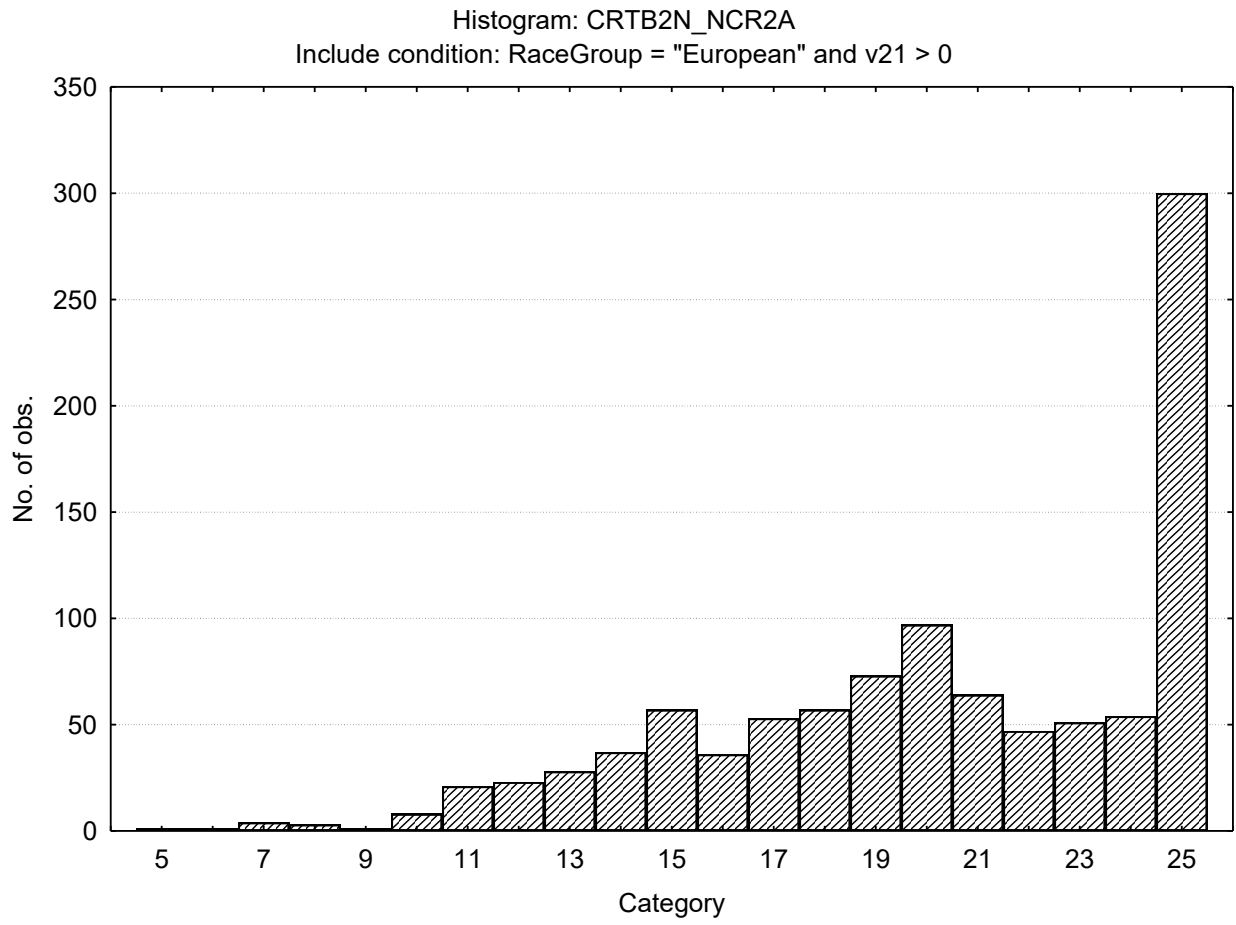
Descriptive statistics for Critical Reasoning Subtests

Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Numerical Critical Reasoning	12.03642	4.710292	0.000000	24.000000	1016	0
Numerical Critical Reasoning items attempted	20.24902	4.452043	5.000000	25.000000	1016	0
Verbal Critical Reasoning	19.51643	6.700912	2.000000	37.000000	1065	0
Verbal Critical Reasoning items attempted	32.55869	7.486993	9.000000	40.000000	1065	0

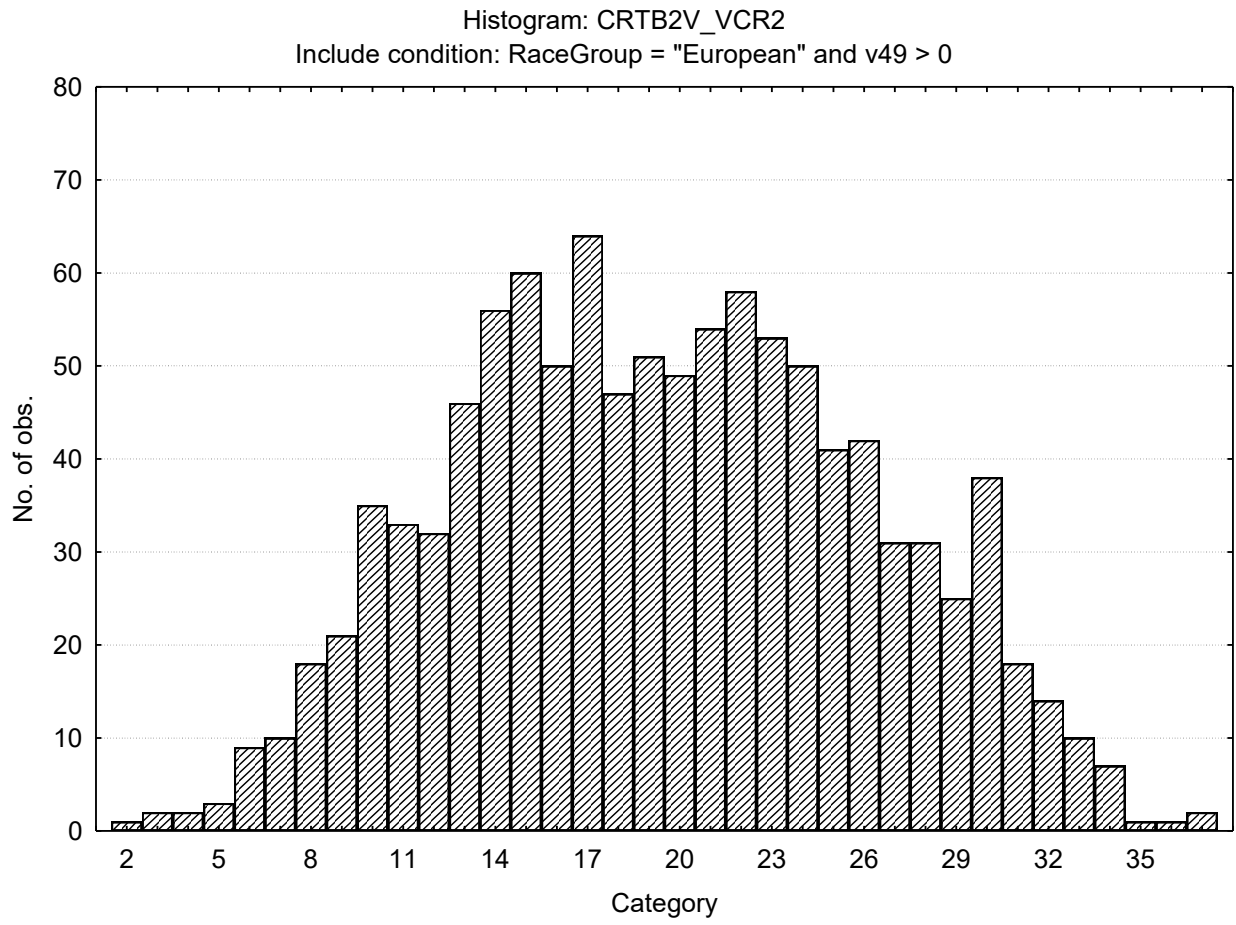
Frequency distribution: Numerical Critical Reasoning



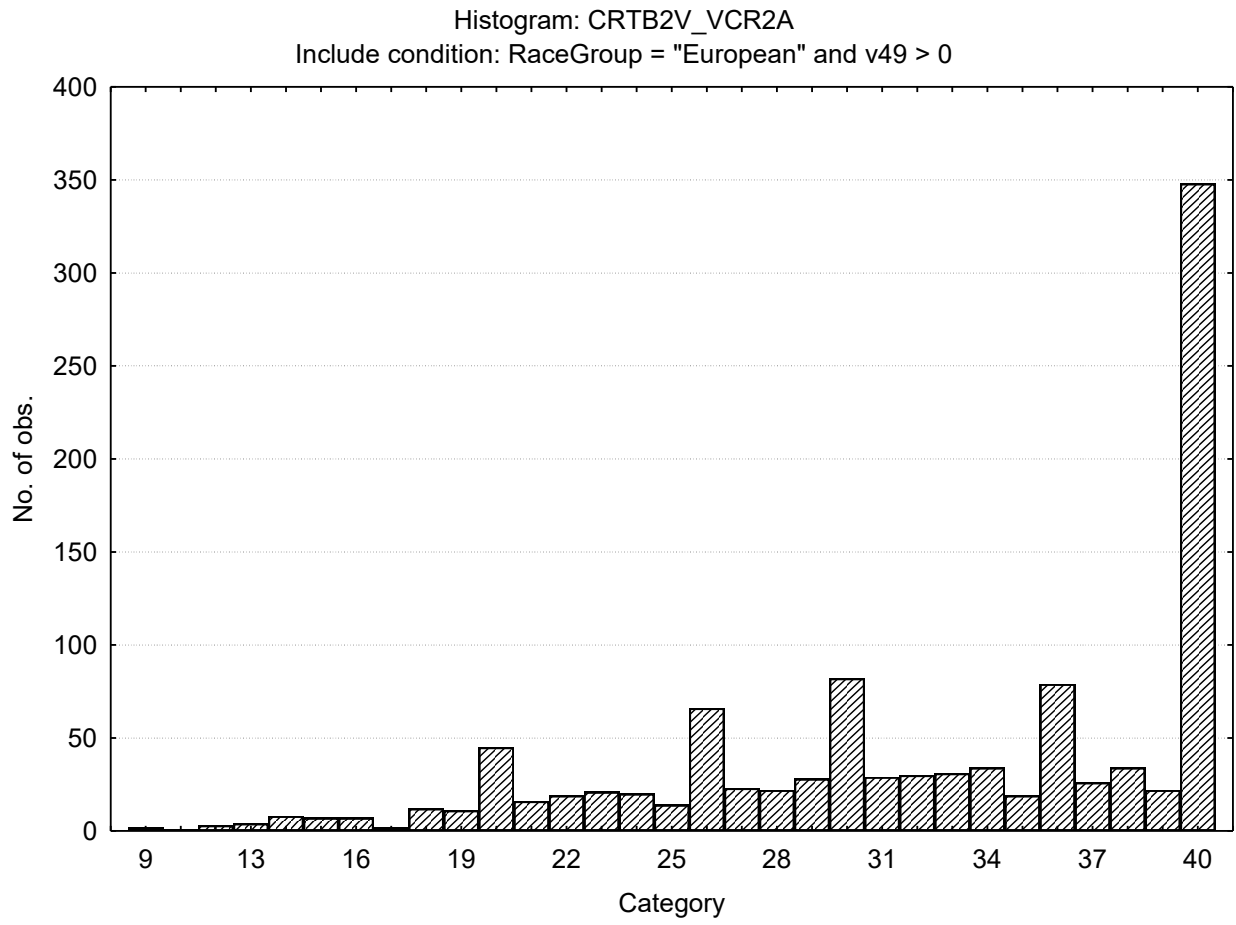
Frequency distribution: Numerical Critical Reasoning items attempted



Frequency distribution: Verbal Critical Reasoning



Frequency distribution: Verbal Critical Reasoning items attempted



Stanine table

	S9_1	S9_2	S9_3	S9_4	S9_5	S9_6	S9_7	S9_8	S9_9
NCR2 Numerical Critical Reasoning	0-3	4-6	7-8	9-10	11-13	14-15	16-17	18-20	21-24
NCR2 Items Attempted	5-12	13-14	15-16	17-19	20-21	22-23	24-25		
VCR2 Verbal Critical Reasoning	2-7	8-11	12-14	15-17	18-21	22-24	25-27	28-31	32-37
VCR2 Items Attempted	9-19	20-23	24-26	27-30	31-34	35-38	39-40		

Critical Reasoning Test Battery norm group: South Africans of Asian race, updated 2010

Sample composition

The sample consisted of South Africans who described their race as Asian, tested by Psytech SA and collaborators in the period leading up to January 2010. Because not all respondents completed both subtests of the Critical Reasoning Test Battery, the biographical information is presented separately for the Numerical Critical Reasoning Test and the Verbal Critical Reasoning Test respectively.

Sample composition: Numerical Critical Reasoning Test

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	342	342	76.68161	76.6816
F	101	443	22.64574	99.3274
U	3	446	0.67265	100.0000
Missing	0	446	0.00000	100.0000

Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	93	93	20.85202	20.8520
Diploma	75	168	16.81614	37.6682
Grade 12	78	246	17.48879	55.1570
Degree	121	367	27.13004	82.2870
<Grade 12	4	371	0.89686	83.1839
Vocational Training	13	384	2.91480	86.0987
Missing	62	446	13.90135	100.0000

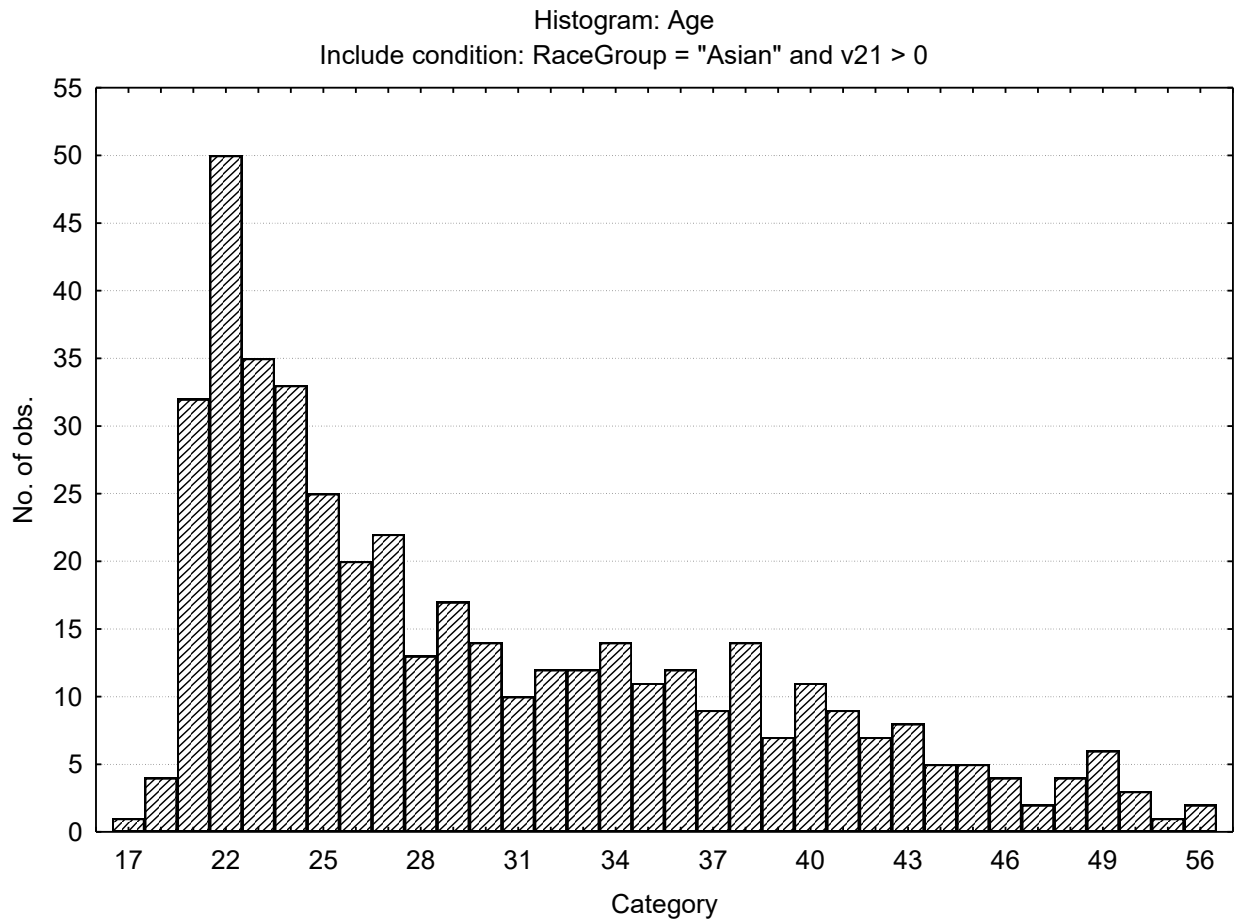
Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
English	419	419	93.94619	93.9462
isiZulu	2	421	0.44843	94.3946
isiXhosa	2	423	0.44843	94.8430

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Sepedi	2	425	0.44843	95.2915
Missing	21	446	4.70852	100.0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
English	419	419	93.94619	93.9462
Indigenous	6	425	1.34529	95.2915
Missing	21	446	4.70852	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Asian	446	446	100.0000	100.0000
Missing	0	446	0.0000	100.0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	29.89631	8.087046	17.00000	56.00000	434	12



Sample composition: Verbal Critical Reasoning Test Battery

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	349	349	77.04194	77.0419
F	101	450	22.29581	99.3377
U	3	453	0.66225	100.0000
Missing	0	453	0.00000	100.0000

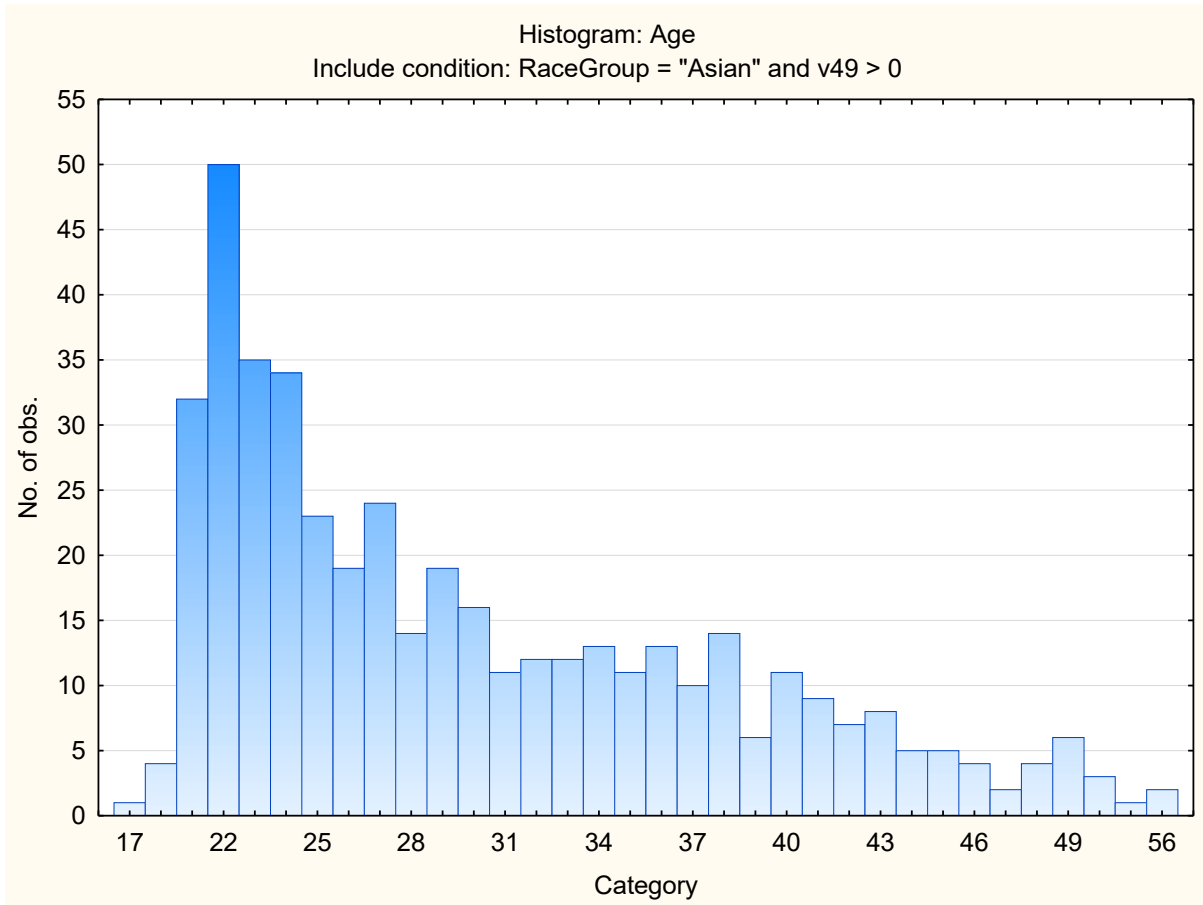
Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	100	100	22.07506	22.0751
Diploma	73	173	16.11479	38.1898
Grade 12	80	253	17.66004	55.8499
Degree	121	374	26.71082	82.5607
<Grade 12	4	378	0.88300	83.4437
Vocational Training	14	392	3.09051	86.5342
Missing	61	453	13.46578	100.0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
English	425	425	93.81898	93.8190
isiZulu	2	427	0.44150	94.2605
isiXhosa	2	429	0.44150	94.7020
Sepedi	2	431	0.44150	95.1435
Missing	22	453	4.85651	100.0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
English	425	425	93.81898	93.8190
Indigenous	6	431	1.32450	95.1435
Missing	22	453	4.85651	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Asian	453	453	100.0000	100.0000
Missing	0	453	0.0000	100.0000

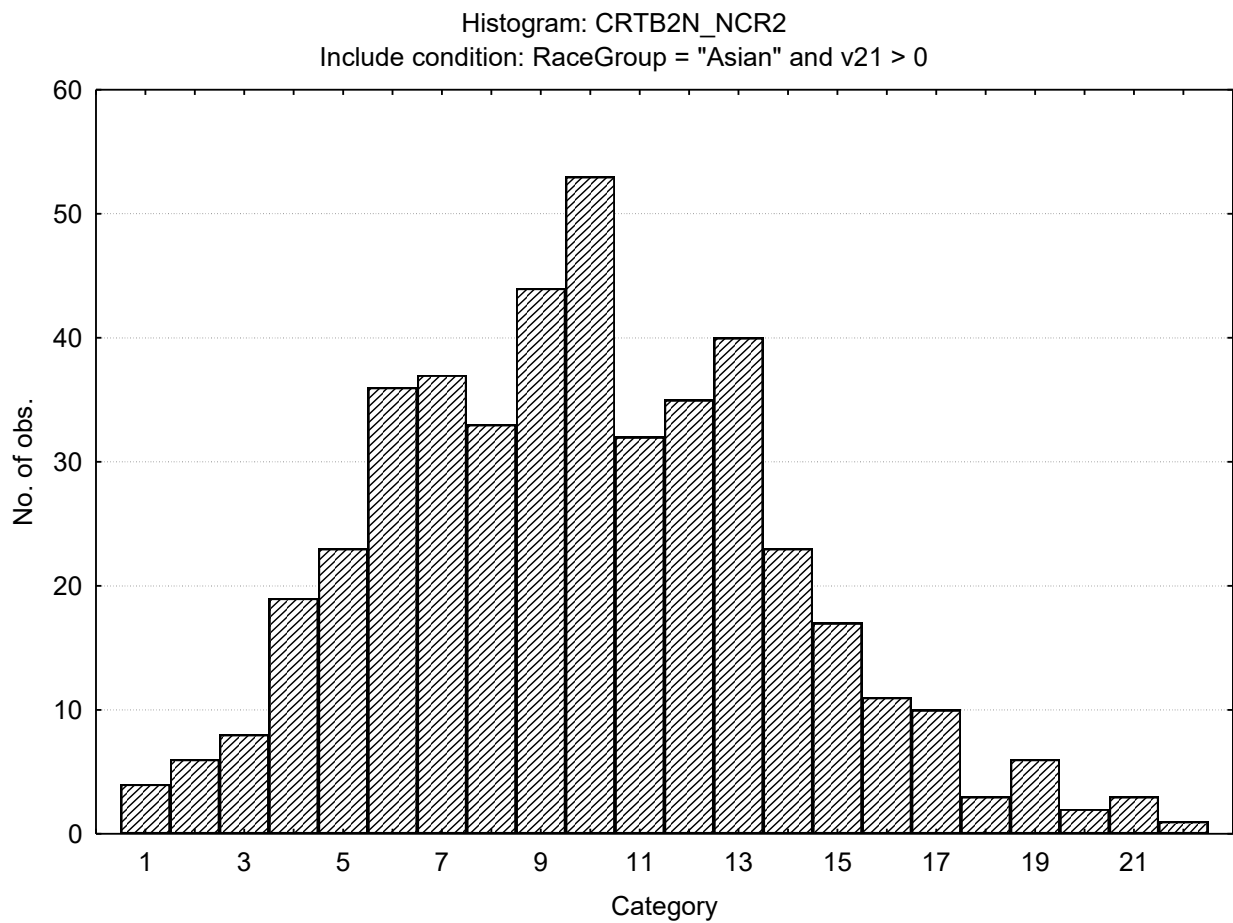
Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	29.89545	8.029160	17.00000	56.00000	440	13



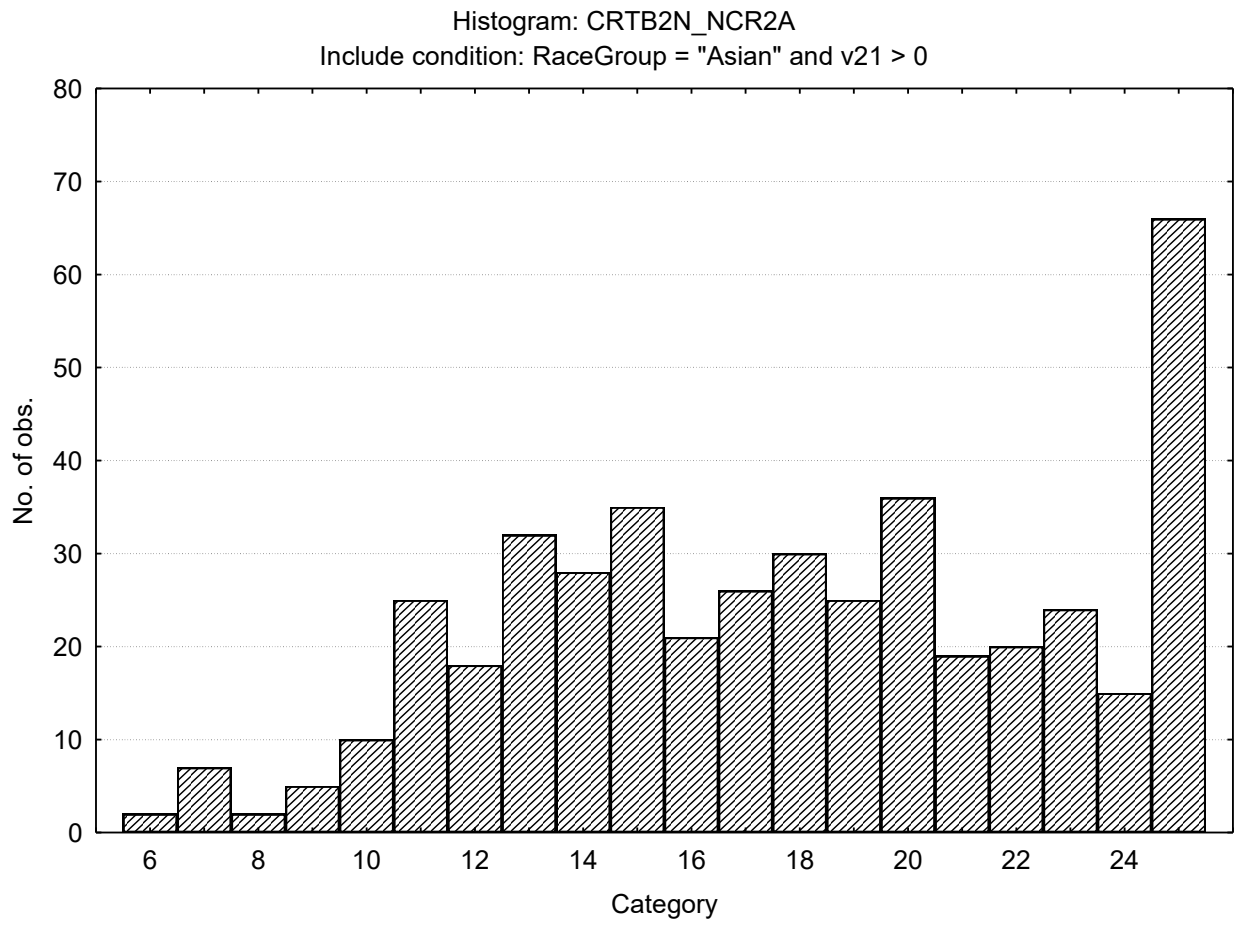
Descriptive statistics on Verbal Critical Reasoning Test scales

Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Numerical Critical Reasoning	9.87444	3.975478	1.000000	22.00000	446	0
Numerical Critical Reasoning items attempted	17.84753	4.960435	6.000000	25.00000	446	0
Verbal Critical Reasoning	15.51876	6.386360	2.000000	38.00000	453	0
Verbal Critical Reasoning items attempted	27.69095	9.219632	8.000000	40.00000	453	0

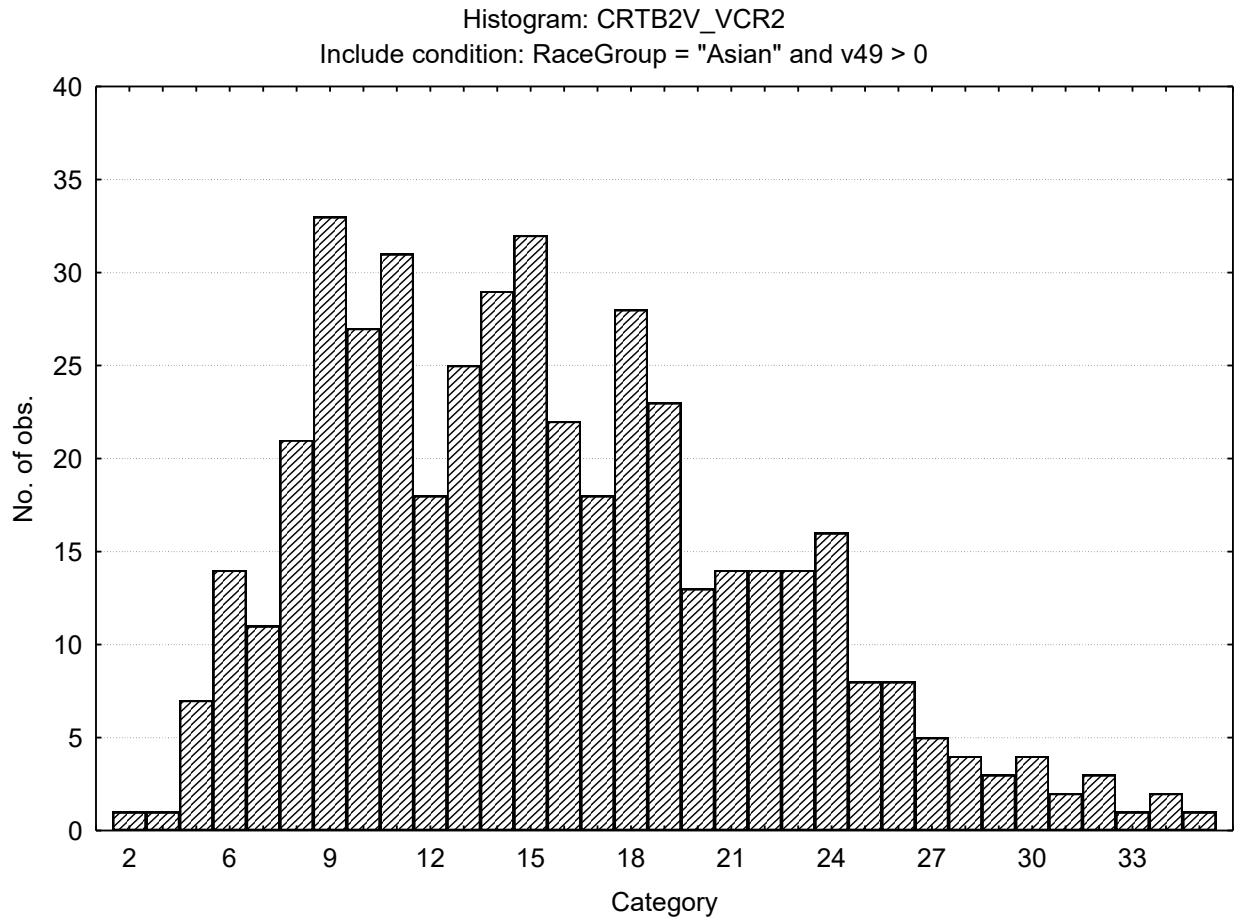
Frequency distribution: Numerical Critical Reasoning



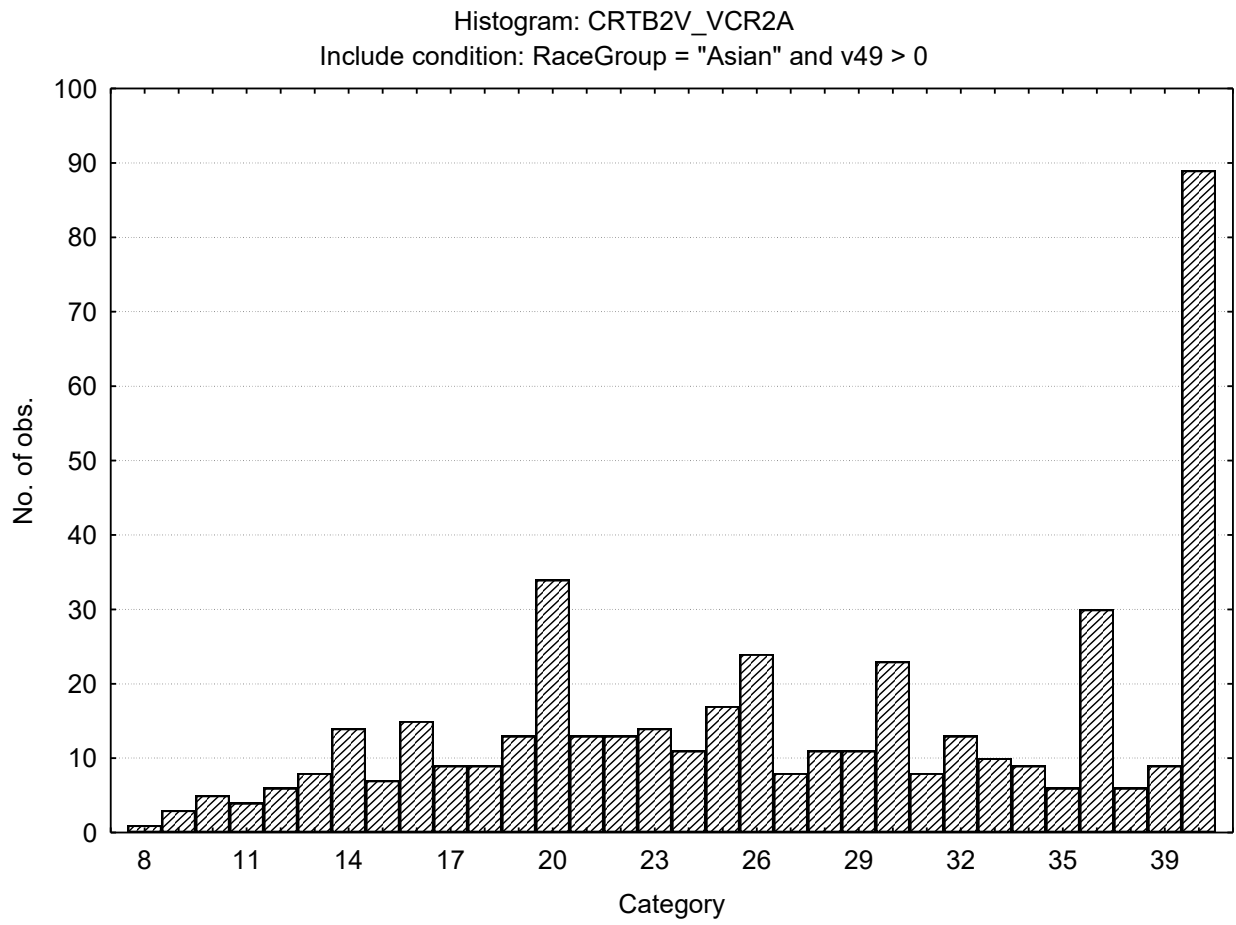
Frequency distribution: Numerical Critical Reasoning items attempted



Frequency distribution: Verbal Critical Reasoning



Frequency distribution: Verbal Critical Reasoning items attempted



Stanine table

	S9_1	S9_2	S9_3	S9_4	S9_5	S9_6	S9_7	S9_8	S9_9
NCR2 Numerical Critical Reasoning	1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	17-22
NCR2 Items Attempted	6-9	10-11	12-14	15-16	17-19	20-21	22-24	25-25	
VCR2 Verbal Critical Reasoning	2-4	5-7	8-10	11-13	14-17	18-20	21-23	24-26	27-38
VCR2 Items Attempted	8-11	12-16	17-20	21-25	26-29	30-34	35-39	40-40	

Critical Reasoning Test Battery norm group: South African general population updated 2010

Sample composition

The sample consisted of South Africans tested by Psytech South Africa and collaborators in the period leading up to January 2010. Not all respondents completed both subtests of the Critical Reasoning Test Battery, therefore the biographical particulars are reported separately for the Numerical Critical Reasoning Test and the Verbal Critical Reasoning Test respectively.

Sample composition: Numerical Critical Reasoning Test

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	3038	3038	64.46000	64.4600
F	1654	4692	35.09442	99.5544
U	21	4713	0.44558	100.0000
Missing	0	4713	0.00000	100.0000

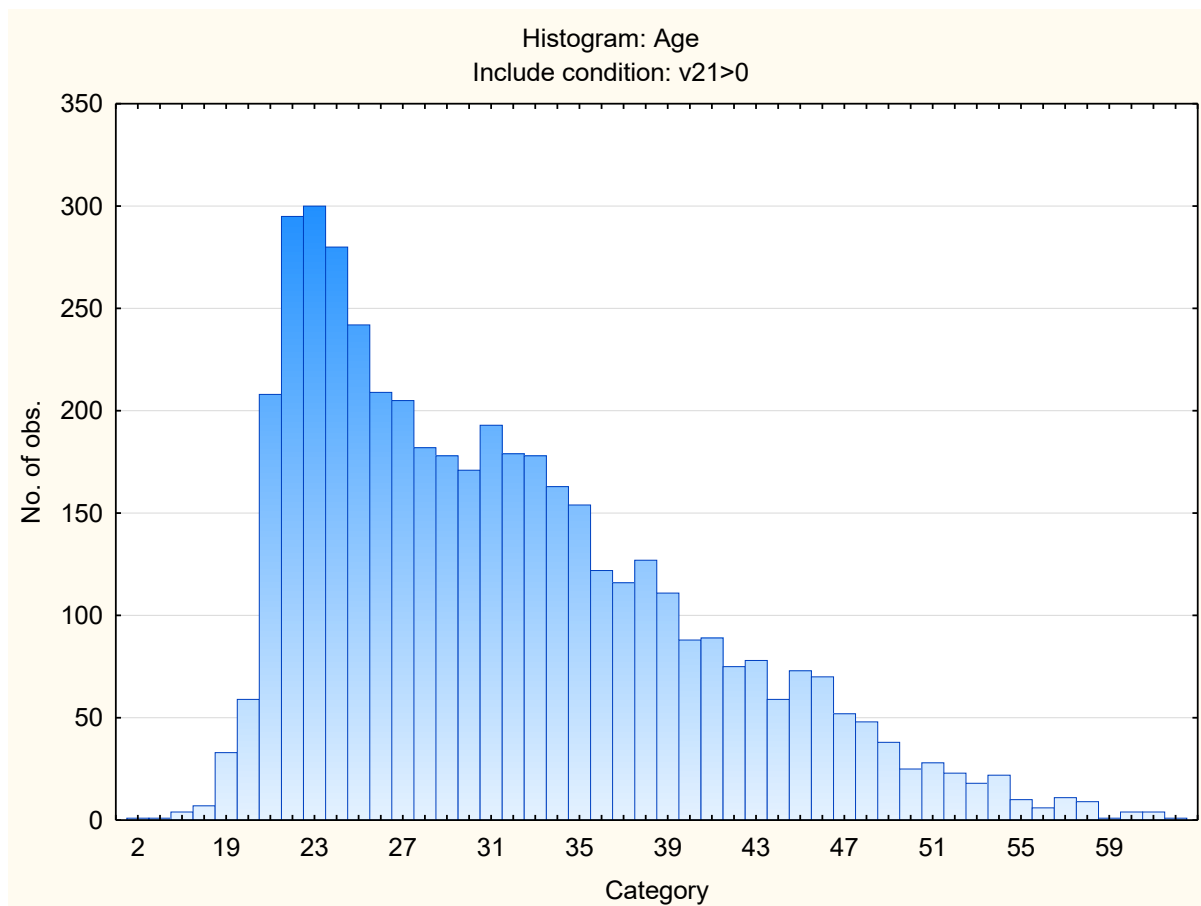
Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	535	535	11.35158	11.3516
Diploma	779	1314	16.52875	27.8803
Grade 12	450	1764	9.54806	37.4284
Degree	818	2582	17.35625	54.7846
<Grade 12	25	2607	0.53045	55.3151
Vocational Training	64	2671	1.35795	56.6730
Missing	2042	4713	43.32697	100.0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
English	1147	1147	24.33694	24.3369
Setswana	144	1291	3.05538	27.3923
Afrikaans	463	1754	9.82389	37.2162
isiZulu	364	2118	7.72332	44.9395
Xitsonga	44	2162	0.93359	45.8731
isiXhosa	278	2440	5.89858	51.7717
Sepedi	77	2517	1.63378	53.4055
Tshivenda	45	2562	0.95481	54.3603
isiNdebele	11	2573	0.23340	54.5937
siSwati	19	2592	0.40314	54.9968
Sesotho	179	2771	3.79801	58.7948
Missing	1942	4713	41.20518	100.0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
English	1147	1147	24.33694	24.3369
Indigenous	1161	2308	24.63399	48.9709
Afrikaans	463	2771	9.82389	58.7948
Missing	1942	4713	41.20518	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Asian	446	446	9.46319	9.4632
European	1016	1462	21.55739	31.0206
African	1336	2798	28.34712	59.3677
Coloured	135	2933	2.86442	62.2321
Missing	1780	4713	37.76788	100.0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	31.49451	8.591961	2.000000	63.00000	4550	163



Sample composition: Verbal Critical Reasoning test

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	3164	3164	64.63739	64.6374
F	1707	4871	34.87232	99.5097
U	24	4895	0.49030	100.0000
Missing	0	4895	0.00000	100.0000

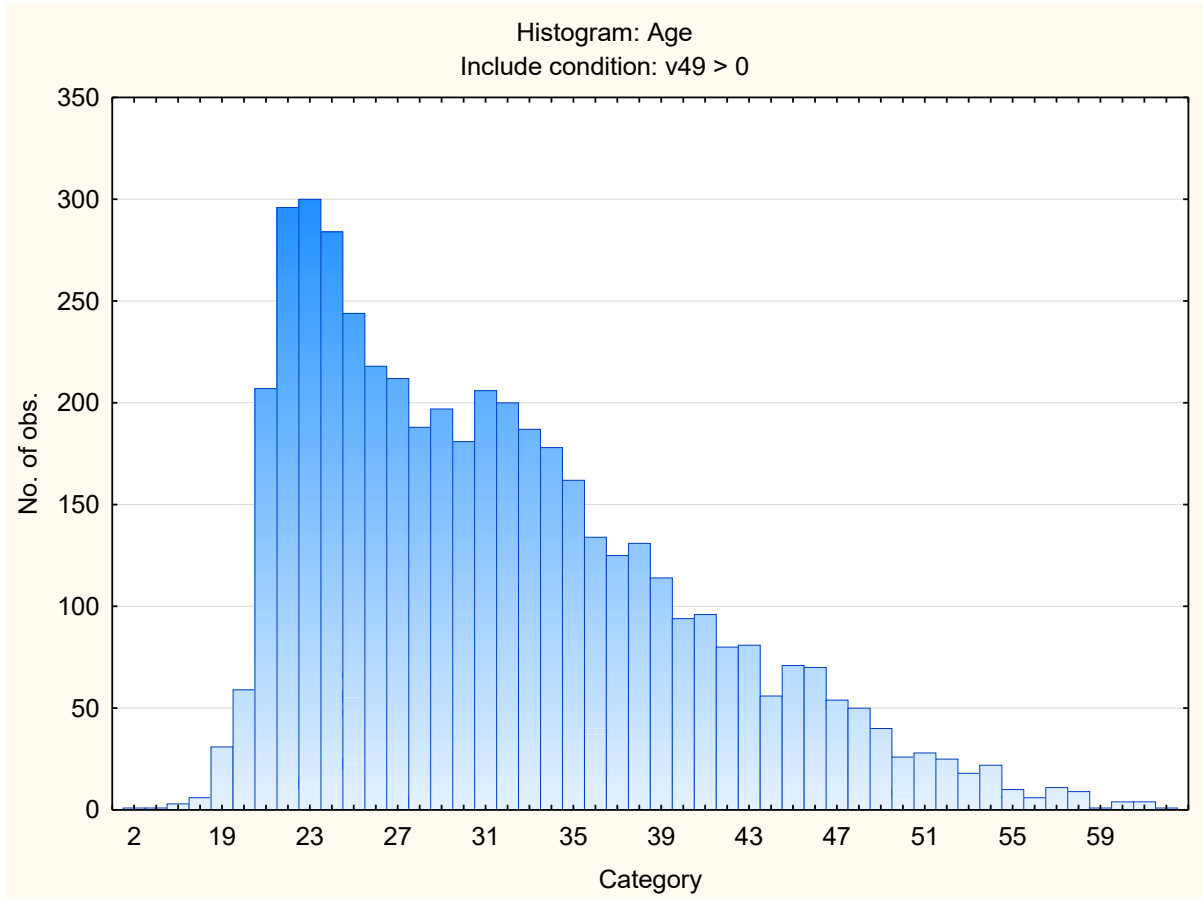
Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	577	577	11.78754	11.7875
Diploma	783	1360	15.99591	27.7835
Grade 12	444	1804	9.07048	36.8539
Degree	857	2661	17.50766	54.3616
<Grade 12	24	2685	0.49030	54.8519
Vocational Training	63	2748	1.28703	56.1389
Missing	2147	4895	43.86108	100.0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
English	1173	1173	23.96323	23.9632
Setswana	146	1319	2.98264	26.9459
Afrikaans	494	1813	10.09193	37.0378
isiZulu	357	2170	7.29316	44.3309
Xitsonga	43	2213	0.87845	45.2094
isiXhosa	277	2490	5.65884	50.8682
Sepedi	79	2569	1.61389	52.4821
Tshivenda	47	2616	0.96016	53.4423
isiNdebele	10	2626	0.20429	53.6466
siSwati	20	2646	0.40858	54.0552
Sesotho	178	2824	3.63636	57.6915
Missing	2071	4895	42.30848	100.0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
English	1173	1173	23.96323	23.9632
Indigenous	1157	2330	23.63636	47.5996
Afrikaans	494	2824	10.09193	57.6915
Missing	2071	4895	42.30848	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Asian	453	453	9.25434	9.2543
European	1065	1518	21.75689	31.0112
African	1338	2856	27.33401	58.3453
Coloured	136	2992	2.77835	61.1236
Missing	1903	4895	38.87640	100.0000

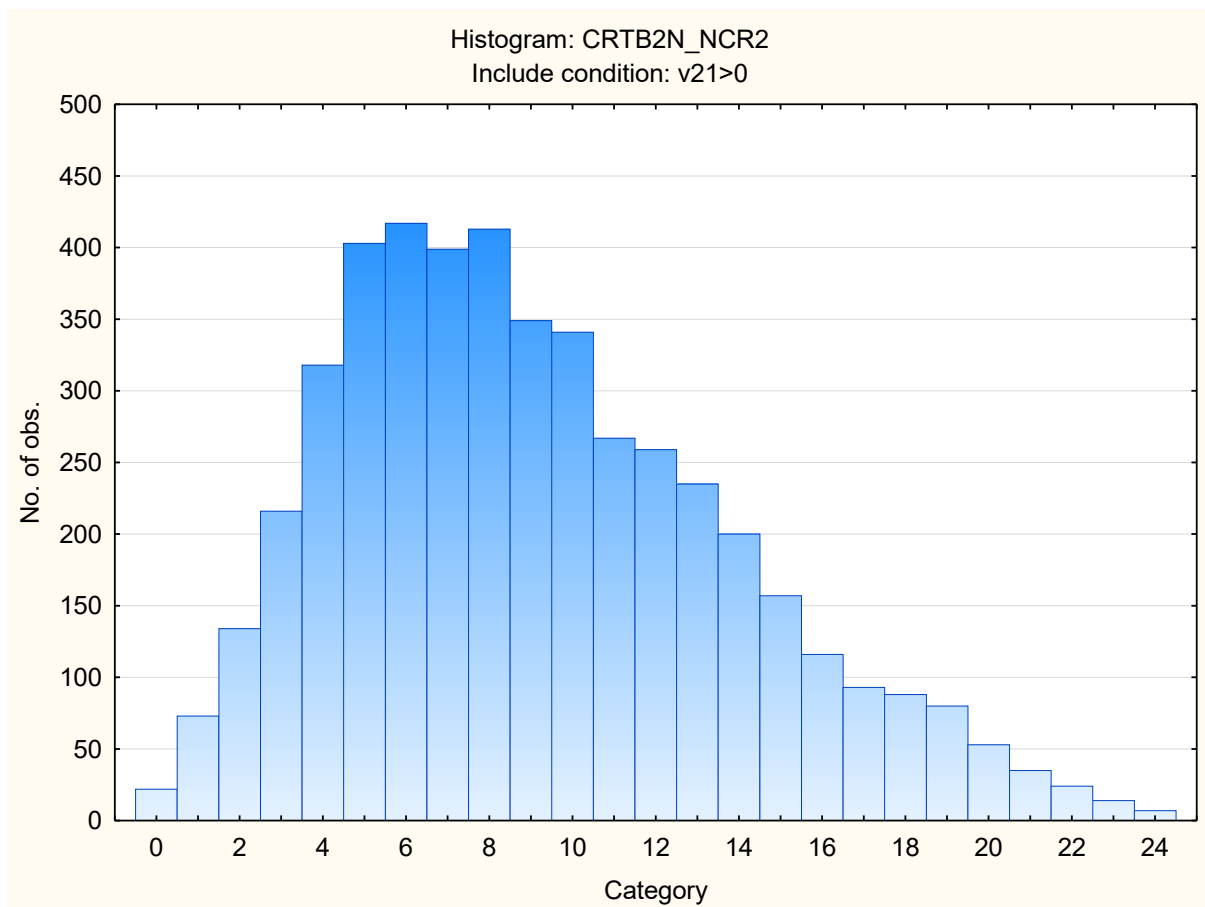
Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	31.57518	8.499795	2.000000	63.00000	4722	173



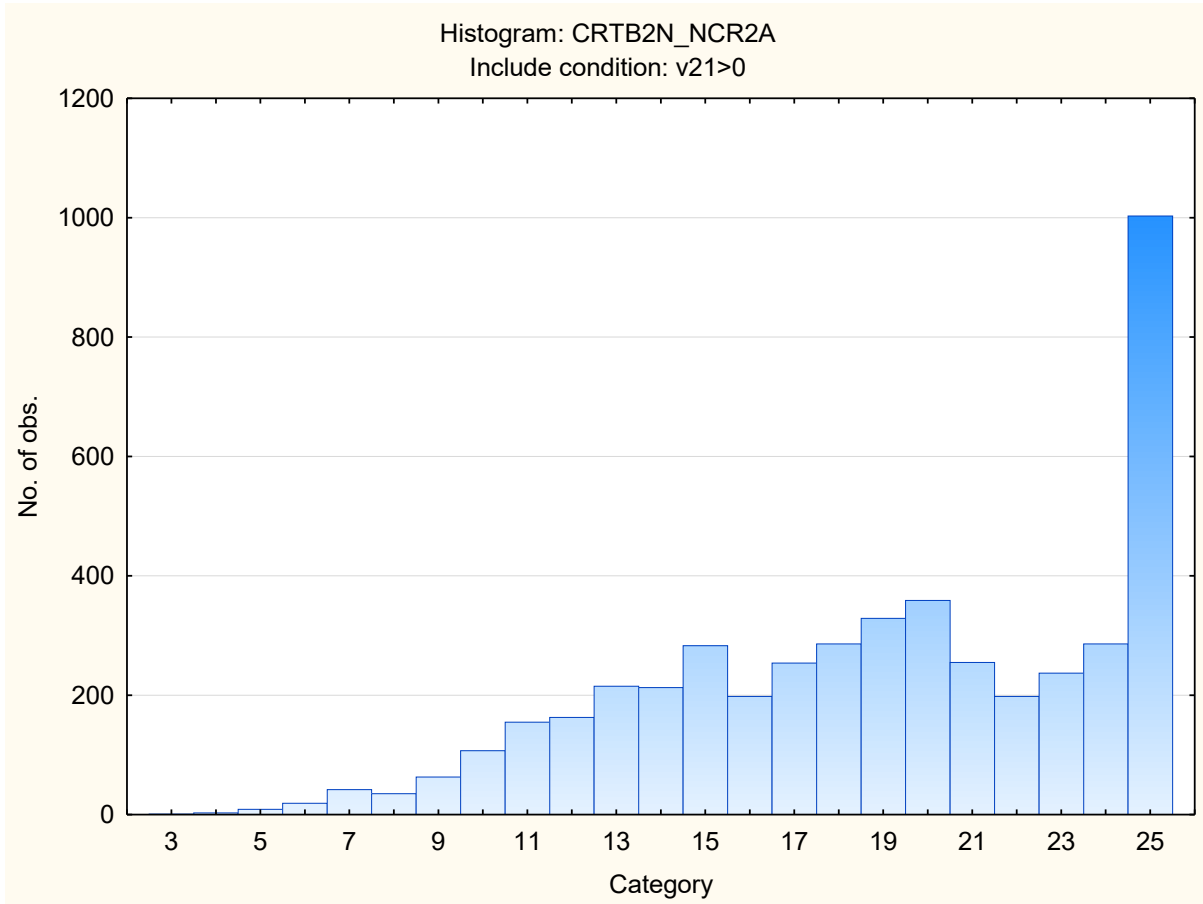
Descriptive statistics for Critical Reasoning Test Battery scales

Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Numerical Critical Reasoning	9.13113	4.734437	0.000000	24.000000	4713	0
Numerical Critical Reasoning items attempted	18.93359	5.045006	3.000000	25.000000	4713	0
Verbal Critical Reasoning	15.48315	7.180867	0.000000	38.000000	4895	0
Verbal Critical Reasoning items attempted	29.48417	8.841802	1.000000	40.000000	4895	0

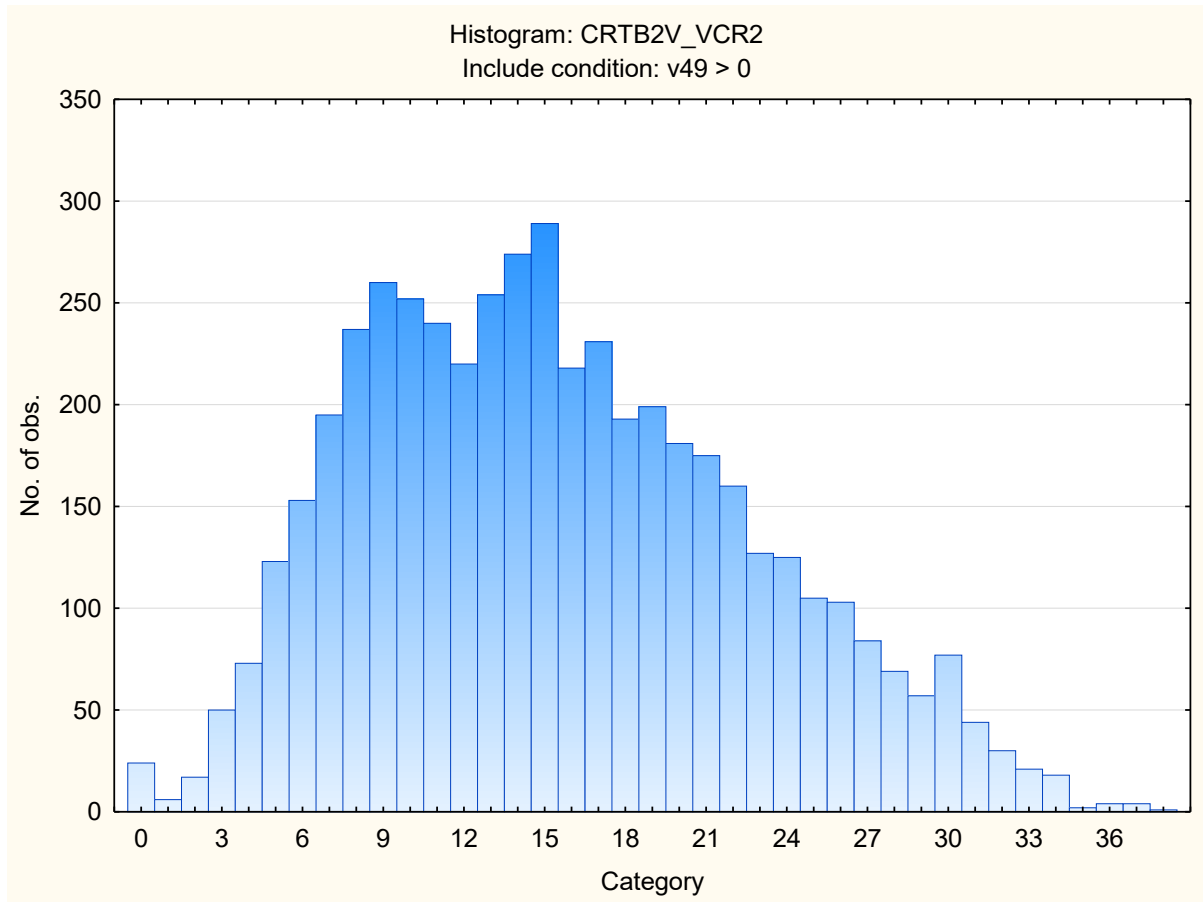
Frequency distribution: Numerical Critical Reasoning Test



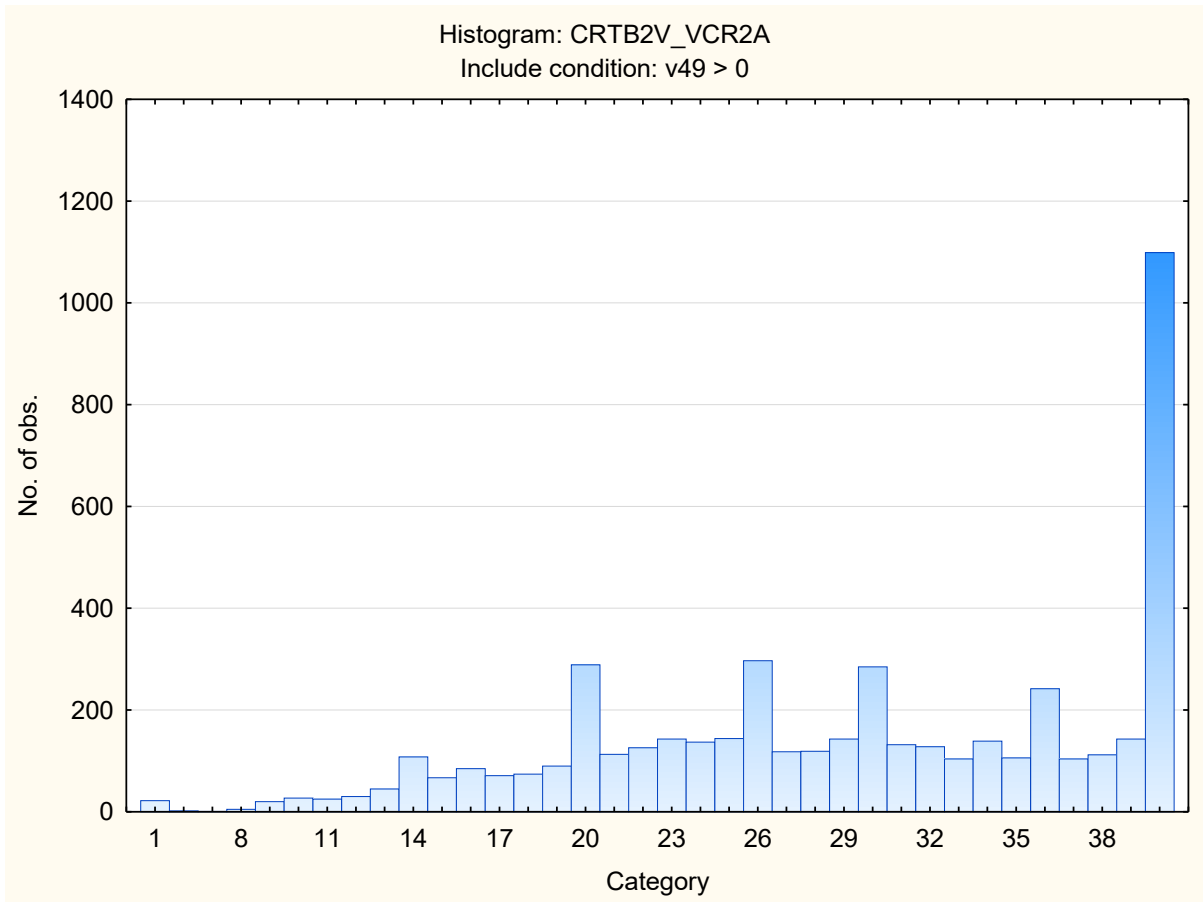
Frequency distribution: Numerical Critical Reasoning Test items attempted



Frequency distribution: Verbal Critical Reasoning Test



Frequency distribution: Verbal Critical Reasoning Test items attempted



Stanine table

	S9_1	S9_2	S9_3	S9_4	S9_5	S9_6	S9_7	S9_8	S9_9
NCR2 Numerical Critical Reasoning	0-0	1-3	4-5	6-7	8-10	11-12	13-15	16-17	18-24
NCR2 Items Attempted	3-10	11-12	13-15	16-17	18-20	21-22	23-25		
VCR2 Verbal Critical Reasoning	0-2	3-6	7-10	11-13	14-17	18-20	21-24	25-28	29-38
VCR2 Items Attempted	1-14	15-18	19-22	23-27	28-31	32-36	37-40		

Critical Reasoning Test Battery Norm Group: South Africans, Indigenous language speakers, updated 2010

Sample composition

The sample consisted of South Africans tested by Psytech SA and collaborators in the period leading up to January 2010. Not all respondents completed both the Numerical and Verbal Critical Reasoning Tests, therefore biographical particulars are reported separately for the two tests.

Sample composition: Numerical Critical Reasoning Test

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	700	700	60.29285	60.2929
F	460	1160	39.62102	99.9139
U	1	1161	0.08613	100.0000
Missing	0	1161	0.00000	100.0000

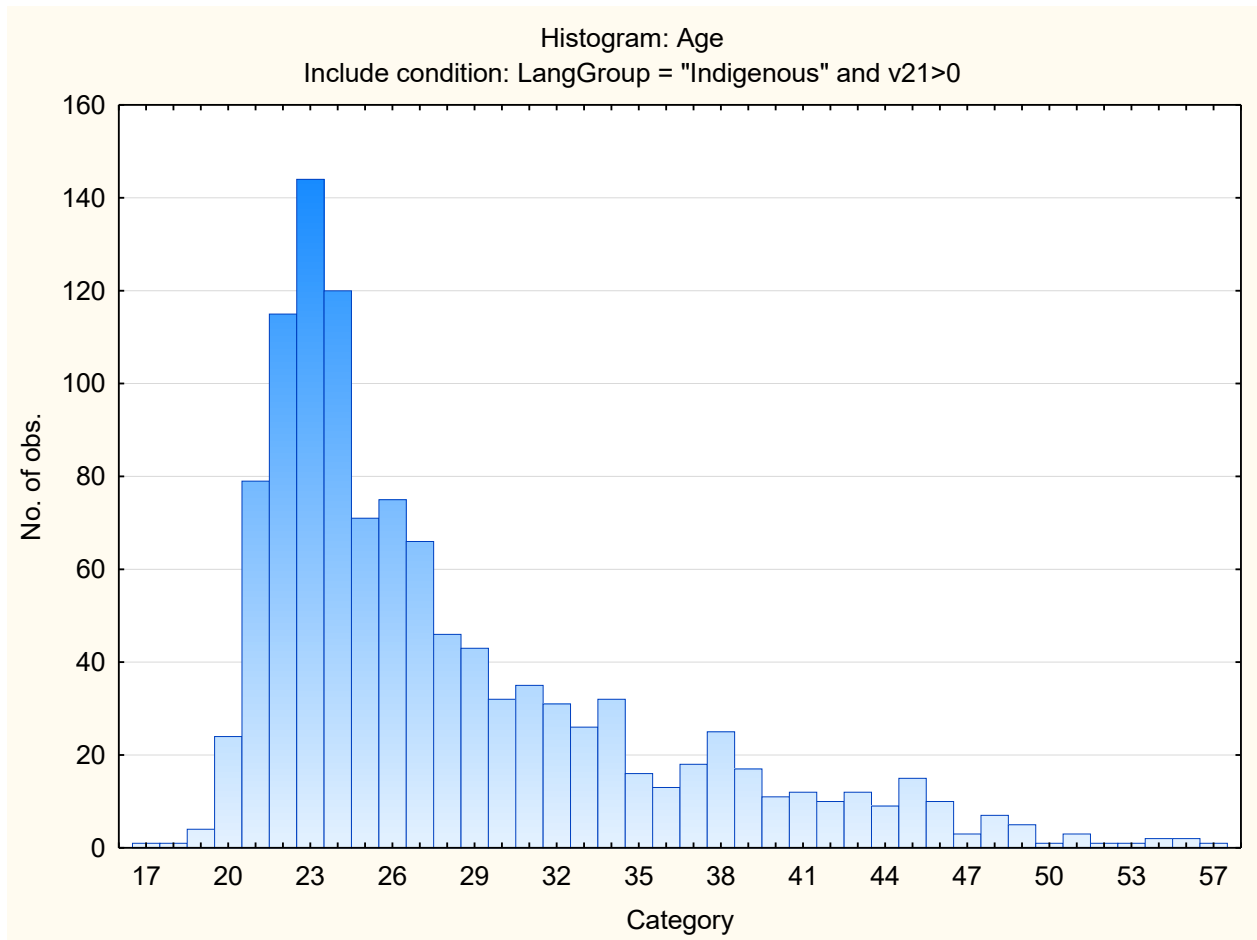
Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	189	189	16.27907	16.2791
Diploma	434	623	37.38157	53.6606
Grade 12	77	700	6.63221	60.2929
Degree	328	1028	28.25151	88.5444
<Grade 12	4	1032	0.34453	88.8889
Vocational Training	19	1051	1.63652	90.5254
Missing	110	1161	9.47459	100.0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Setswana	144	144	12.40310	12.4031
isiZulu	364	508	31.35228	43.7554
Xitsonga	44	552	3.78984	47.5452
isiXhosa	278	830	23.94488	71.4901
Sepedi	77	907	6.63221	78.1223
Tshivenda	45	952	3.87597	81.9983
isiNdebele	11	963	0.94746	82.9457
siSwati	19	982	1.63652	84.5823
Sesotho	179	1161	15.41774	100.0000
Missing	0	1161	0.00000	100.0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	1161	1161	100.0000	100.0000
Missing	0	1161	0.0000	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Asian	6	6	0.51680	0.5168
European	4	10	0.34453	0.8613
African	1146	1156	98.70801	99.5693
Missing	5	1161	0.43066	100.0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	28.10184	7.150294	17.00000	57.00000	1139	22



Sample composition: Verbal Critical Reasoning Test

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	700	700	60.50130	60.5013
F	456	1156	39.41227	99.9136
U	1	1157	0.08643	100.0000
Missing	0	1157	0.00000	100.0000

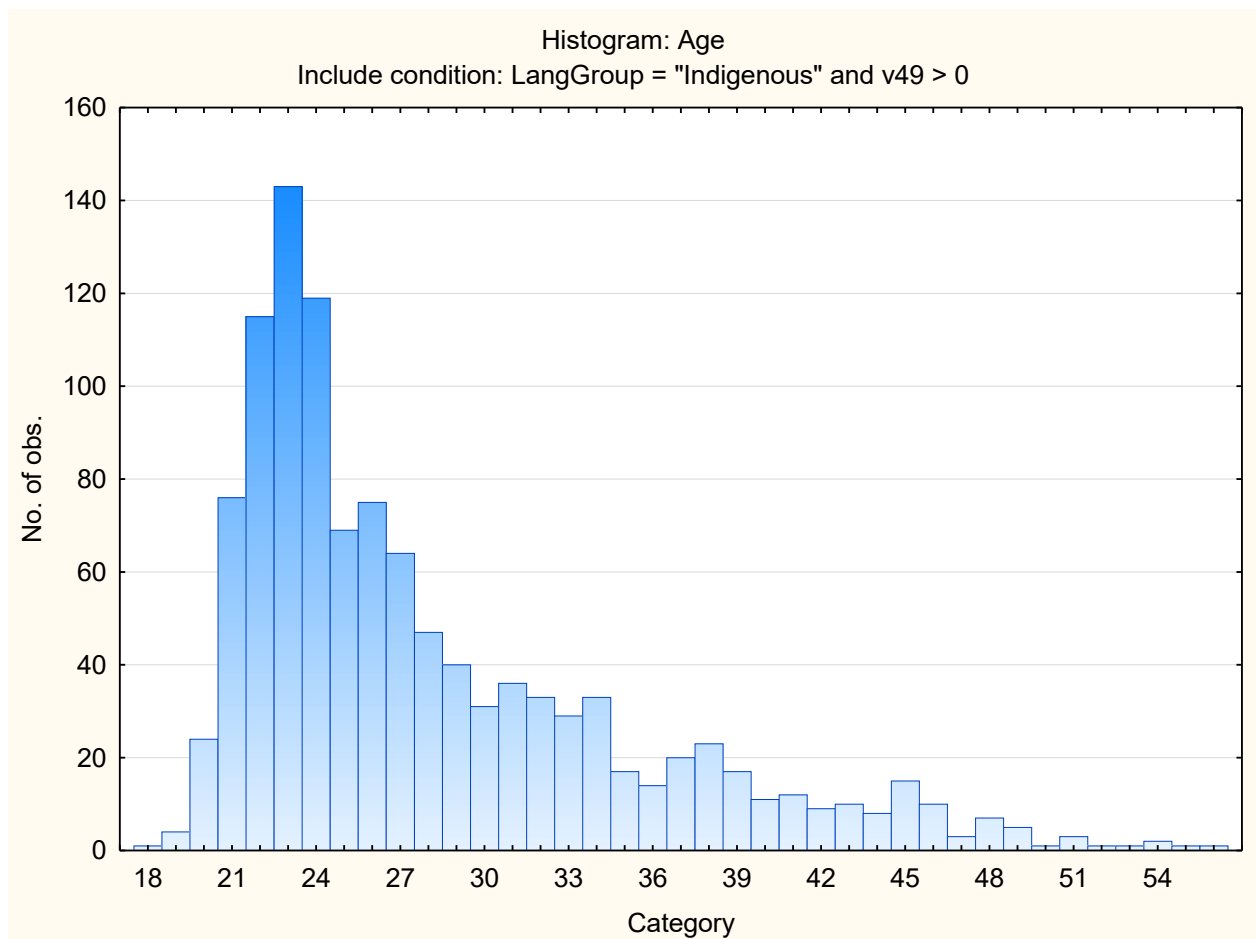
Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	201	201	17.37252	17.3725
Diploma	427	628	36.90579	54.2783
Grade 12	71	699	6.13656	60.4149
Degree	337	1036	29.12705	89.5419
<Grade 12	3	1039	0.25929	89.8012
Vocational Training	16	1055	1.38289	91.1841
Missing	102	1157	8.81590	100.0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Setswana	146	146	12.61884	12.6188
isiZulu	357	503	30.85566	43.4745
Xitsonga	43	546	3.71651	47.1910
isiXhosa	277	823	23.94123	71.1322
Sepedi	79	902	6.82800	77.9602
Tshivenda	47	949	4.06223	82.0225
isiNdebele	10	959	0.86430	82.8868
siSwati	20	979	1.72861	84.6154
Sesotho	178	1157	15.38462	100.0000
Missing	0	1157	0.00000	100.0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	1157	1157	100.0000	100.0000
Missing	0	1157	0.0000	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Asian	6	6	0.51858	0.5186
European	4	10	0.34572	0.8643
African	1142	1152	98.70354	99.5678
Coloured	1	1153	0.08643	99.6543
Missing	4	1157	0.34572	100.0000

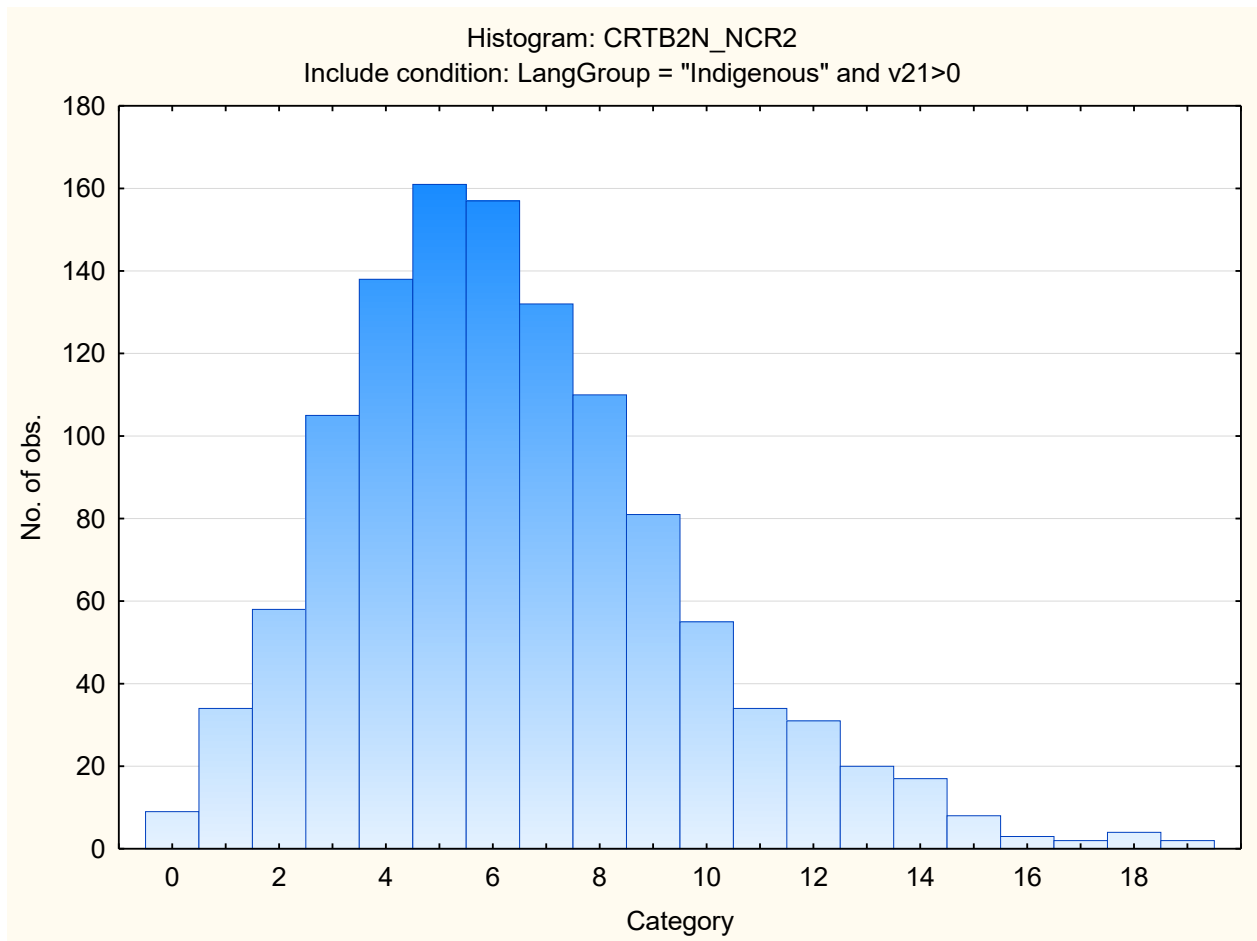
Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	28.10442	7.070547	18.00000	57.00000	1130	27



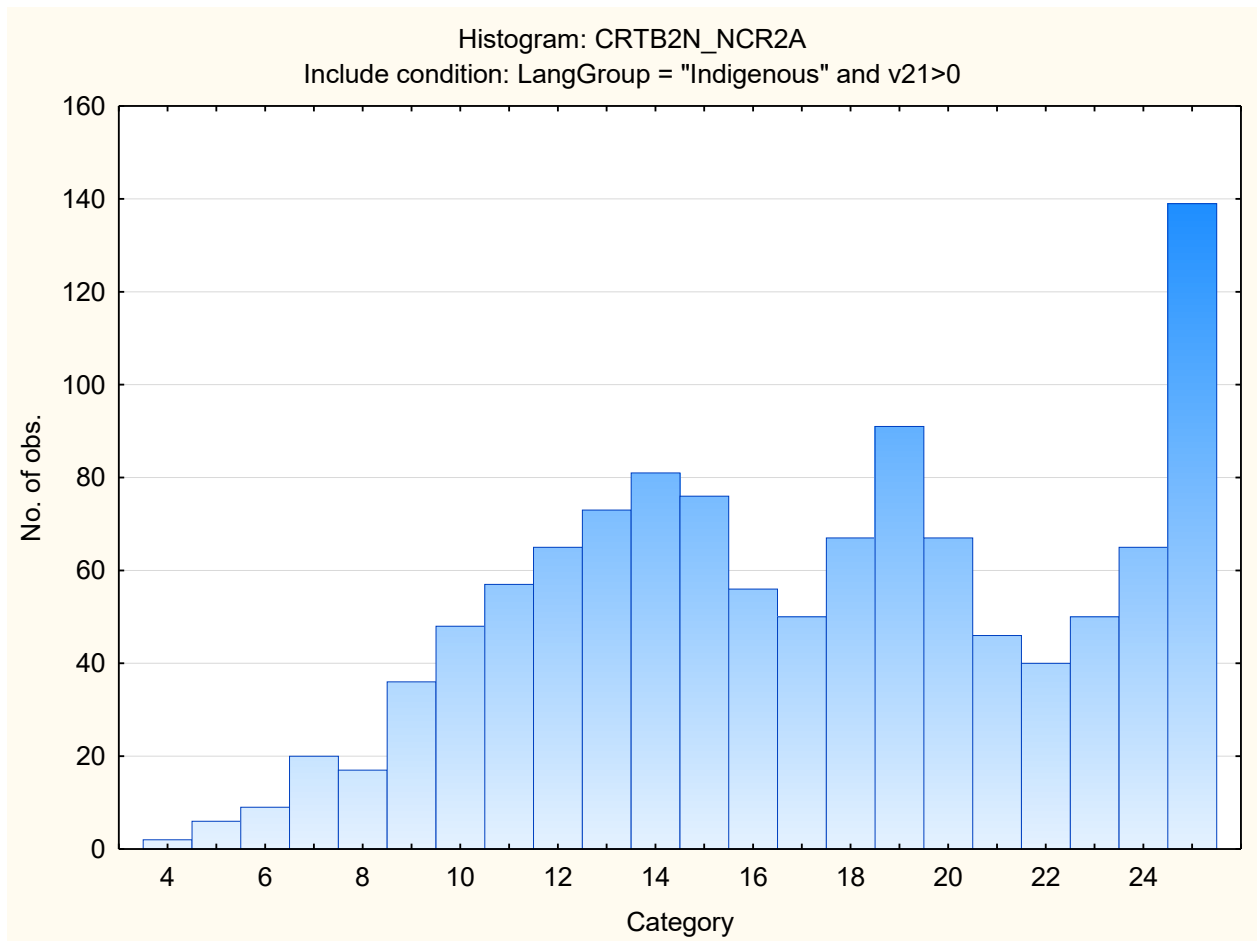
Descriptive statistics on Critical Reasoning Test Battery scores

Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Numerical Critical Reasoning	6.37812	3.211913	0.000000	20.00000	1161	0
Numerical Critical Reasoning Items Attempted	17.10078	5.325379	4.000000	25.00000	1161	0
Verbal Critical Reasoning	10.91530	5.187463	0.000000	31.00000	1157	0
Verbal Critical Reasoning Items Attempted	25.50562	8.550239	6.000000	40.00000	1157	0

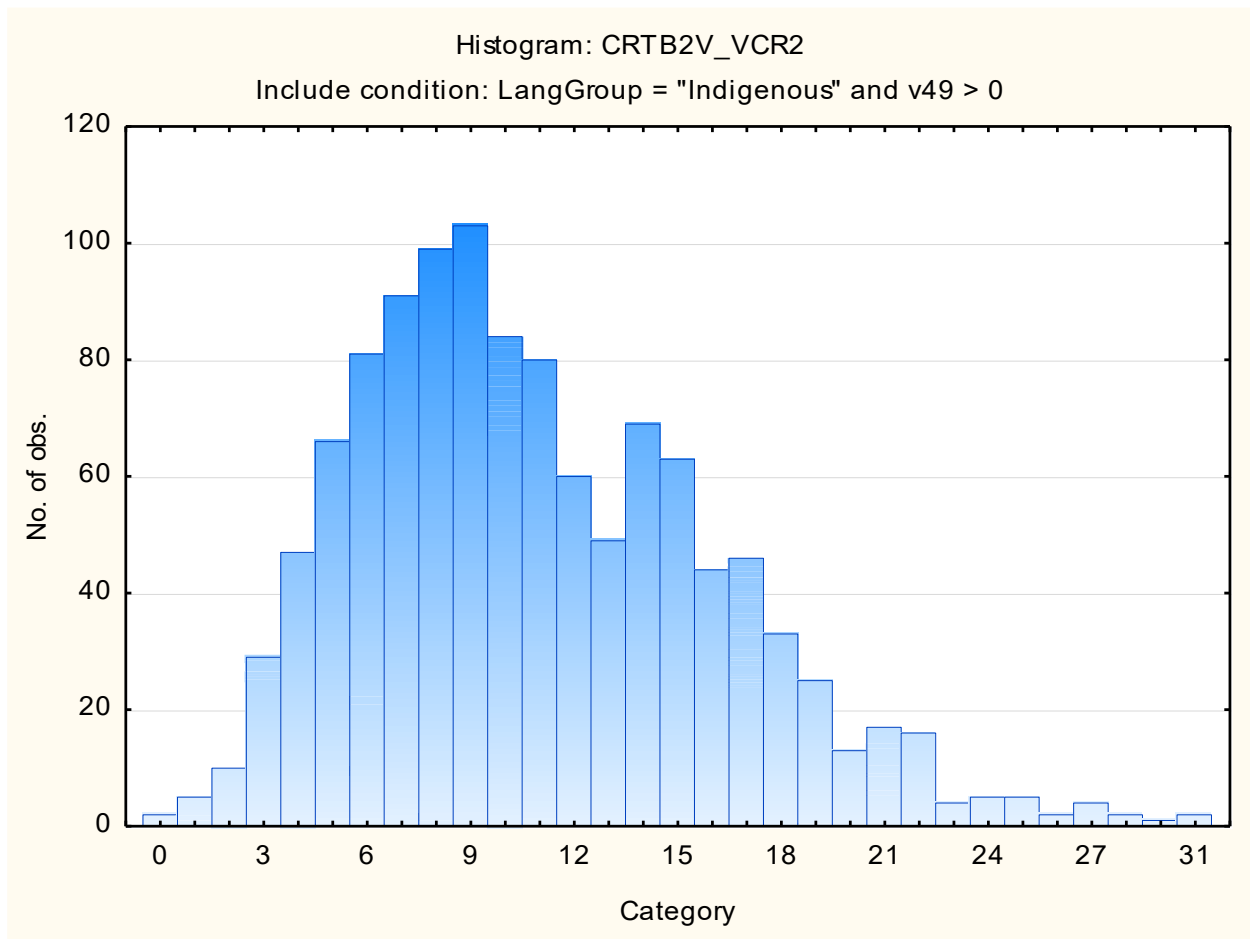
Frequency distribution: Numerical Critical Reasoning



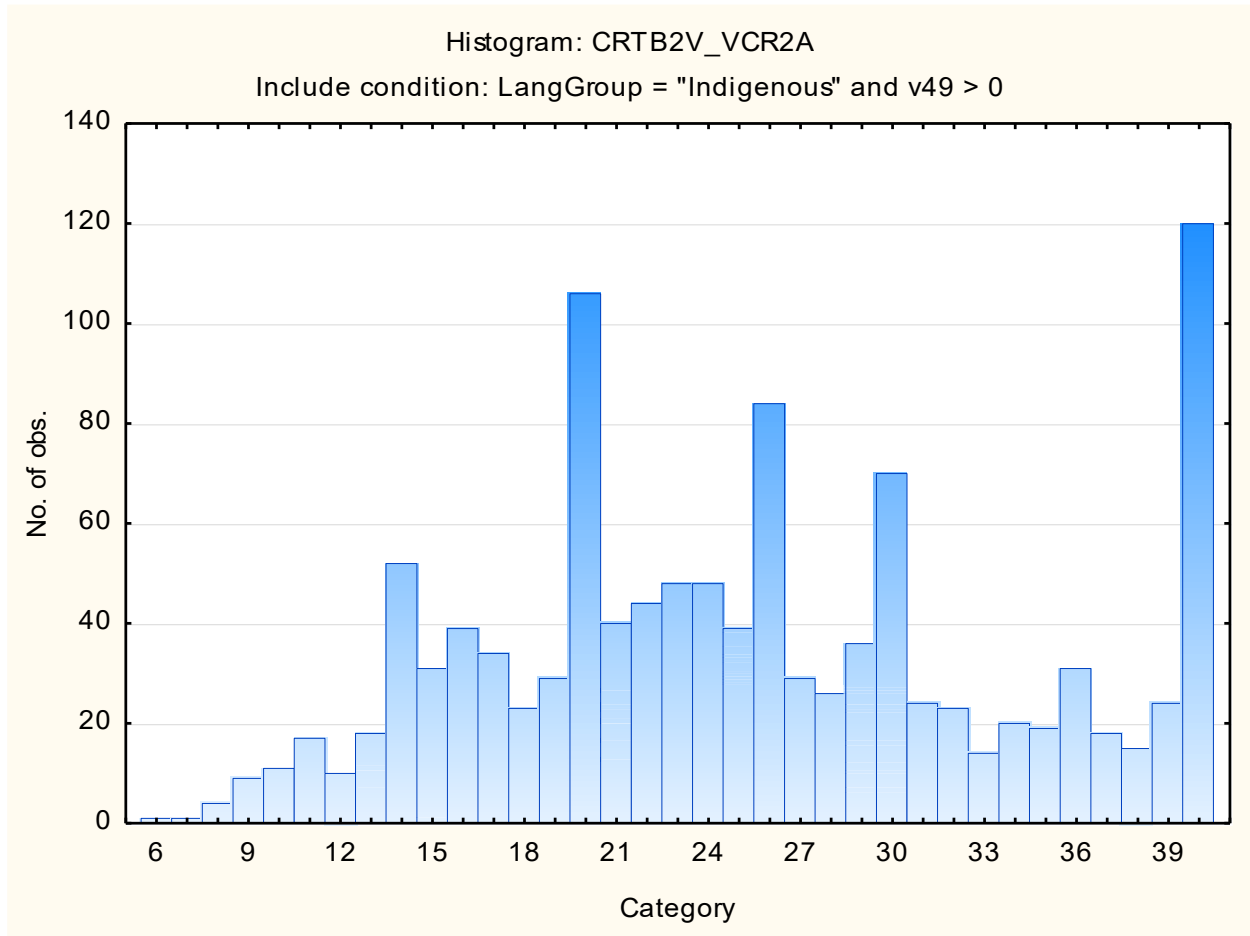
Frequency distribution: Numerical Critical Reasoning Items Attempted



Frequency distribution: Verbal Critical Reasoning



Frequency distribution: Verbal Critical Reasoning Items Attempted



Stanine Table

	S9_1	S9_2	S9_3	S9_4	S9_5	S9_6	S9_7	S9_8	S9_9
NCR2 Numerical Critical Reasoning	0-0	1-2	3-3	4-5	6-7	8-8	9-10	11-11	12-20
NCR2 Items Attempted	4-7	8-10	11-13	14-15	16-18	19-21	22-23	24-25	
VCR2 Verbal Critical Reasoning	0-1	2-4	5-7	8-9	10-12	13-14	15-17	18-19	20-31
VCR2 Items Attempted	6-10	11-14	15-19	20-23	24-27	28-31	32-36	37-40	

Critical Reasoning Test Battery Norm Table: Afrikaans speaking South Africans updated 2010

Sample composition

The sample consisted of South Africans who gave their home language as Afrikaans, tested by Psytech South Africa and collaborators in the period up to January 2010. Not all respondents completed both subtests in the battery, therefore biographical particulars are reported separately for the Numerical and Verbal Critical Reasoning Tests respectively.

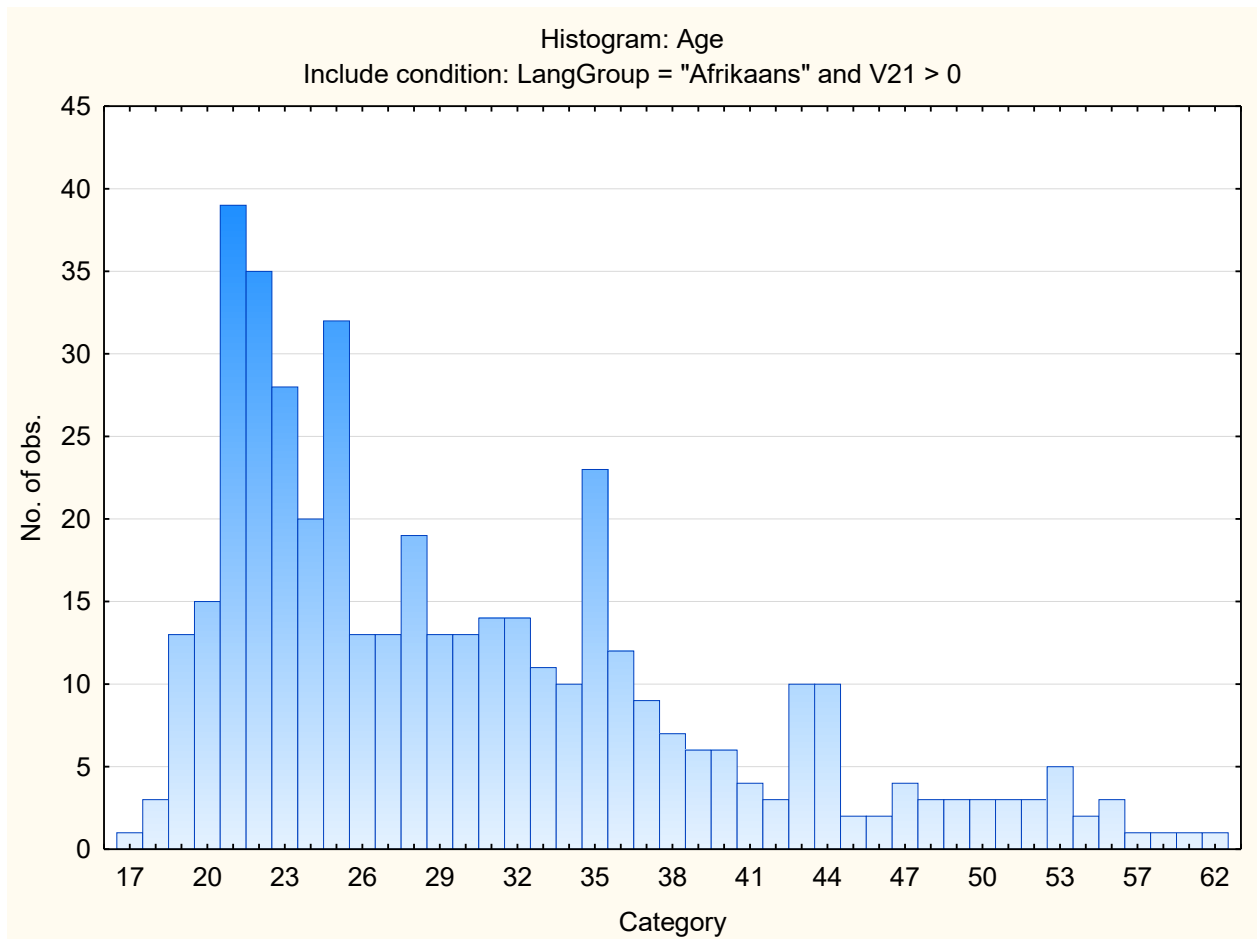
Sample composition: Numerical Critical Reasoning Test

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	292	292	63.06695	63.0670
F	169	461	36.50108	99.5680
U	2	463	0.43197	100.0000
Missing	0	463	0.00000	100.0000

Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	64	64	13.82289	13.8229
Diploma	76	140	16.41469	30.2376
Grade 12	108	248	23.32613	53.5637
Degree	136	384	29.37365	82.9374
<Grade 12	3	387	0.64795	83.5853
Vocational Training	14	401	3.02376	86.6091
Missing	62	463	13.39093	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
European	418	418	90.28078	90.2808
African	5	423	1.07991	91.3607
Coloured	26	449	5.61555	96.9762
Missing	14	463	3.02376	100.0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	30.18245	9.316774	17.00000	62.00000	433	30



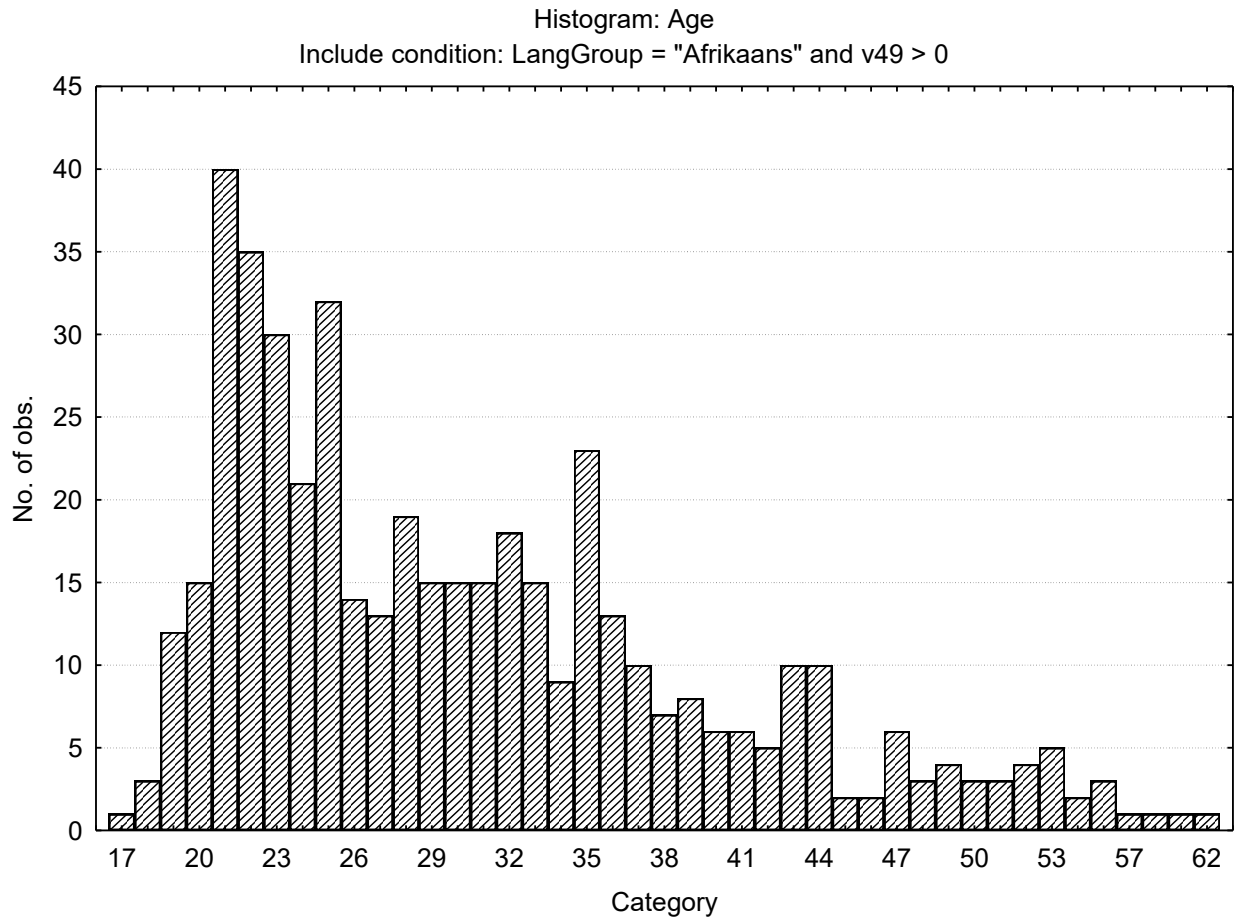
Sample composition: Verbal Critical Reasoning Test

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	313	313	63.36032	63.3603
F	179	492	36.23482	99.5951
U	2	494	0.40486	100.0000
Missing	0	494	0.00000	100.0000

Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	73	73	14.77733	14.7773
Diploma	85	158	17.20648	31.9838
Grade 12	106	264	21.45749	53.4413
Degree	150	414	30.36437	83.8057
<Grade 12	4	418	0.80972	84.6154
Vocational Training	15	433	3.03644	87.6518
Missing	61	494	12.34818	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
European	448	448	90.68826	90.6883
African	7	455	1.41700	92.1053
Coloured	25	480	5.06073	97.1660
Missing	14	494	2.83401	100.0000

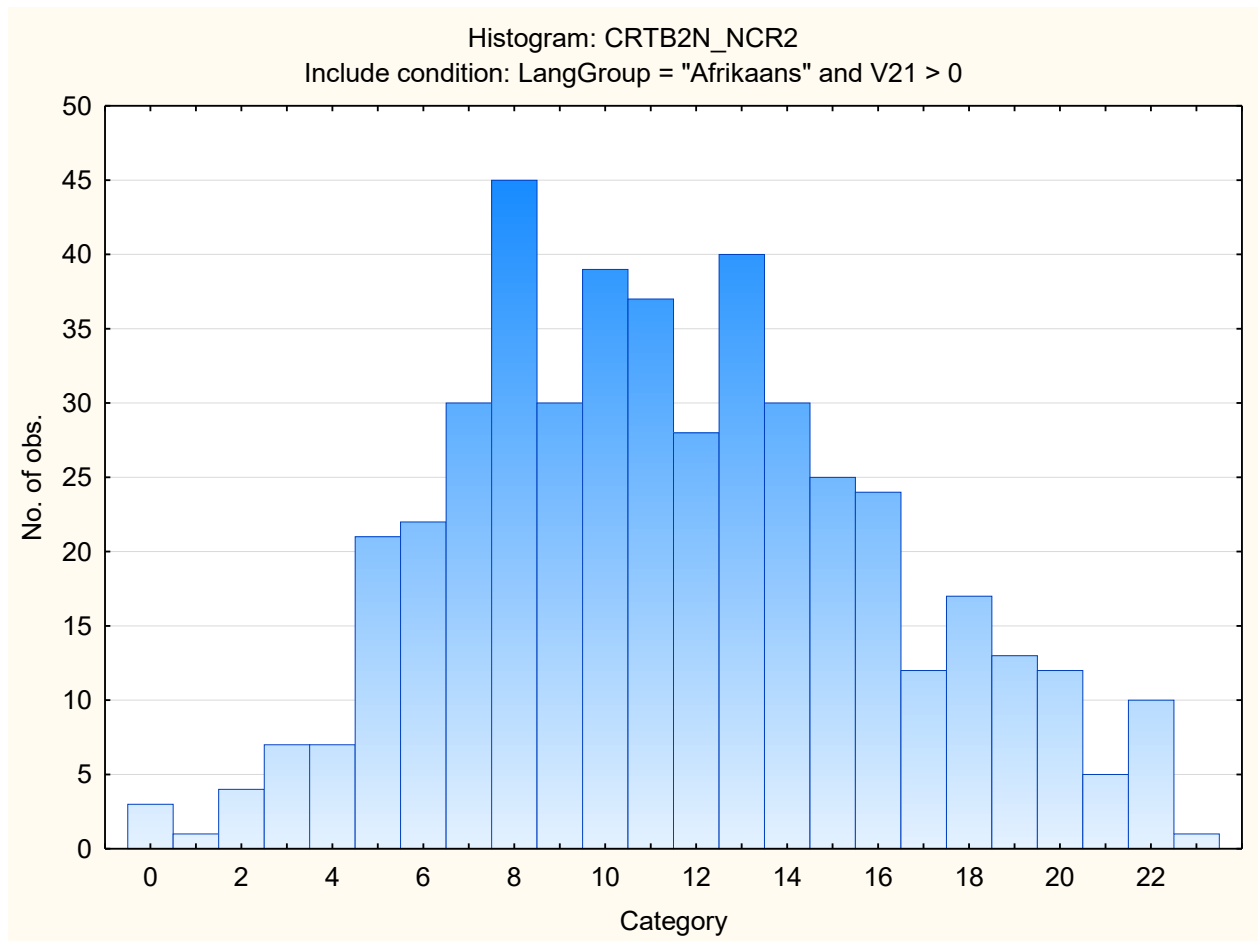
Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	30.48590	9.296231	17.00000	62.00000	461	33



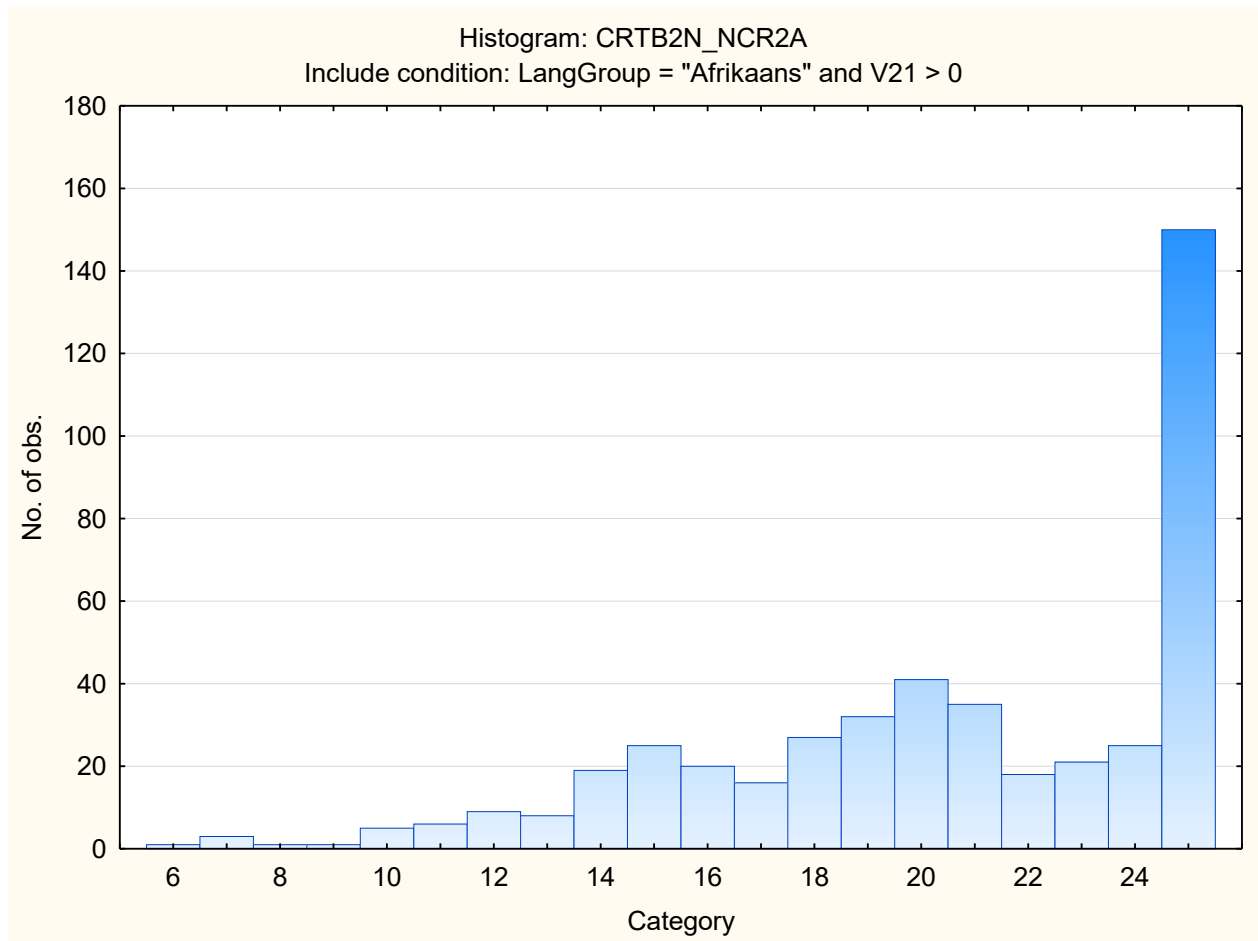
Descriptive statistics on Critical Reasoning Test Battery scales

Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Numerical Critical Reasoning	11.47516	4.705497	0.000000	24.00000	463	0
Numerical Critical Reasoning Items Attempted	20.48164	4.456037	6.000000	25.00000	463	0
Verbal Critical Reasoning	17.77935	6.412929	2.000000	37.00000	494	0
Verbal Critical Reasoning Items Attempted	32.13765	7.550592	9.000000	40.00000	494	0

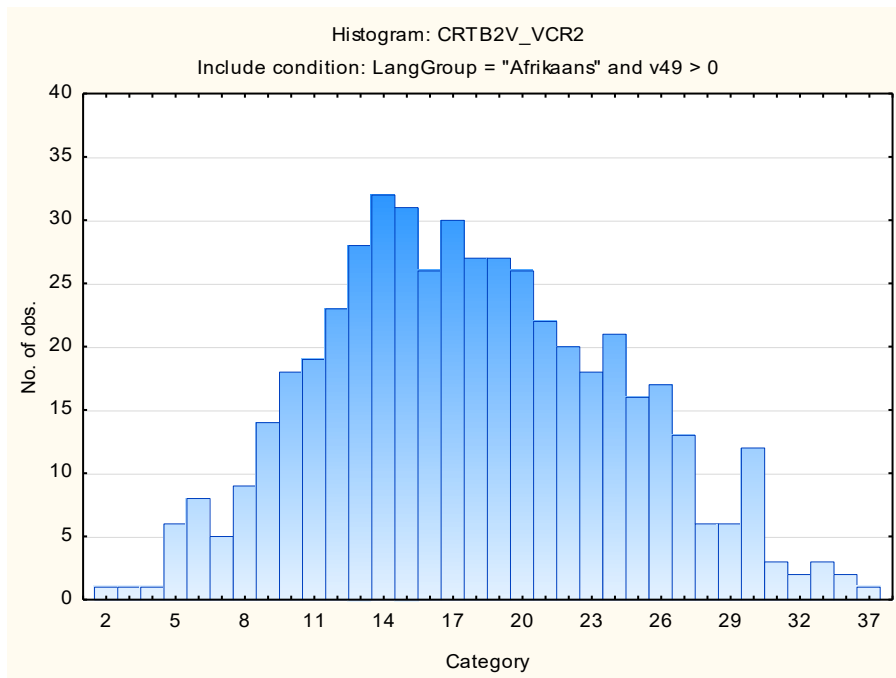
Frequency distribution: Numerical Critical Reasoning Test



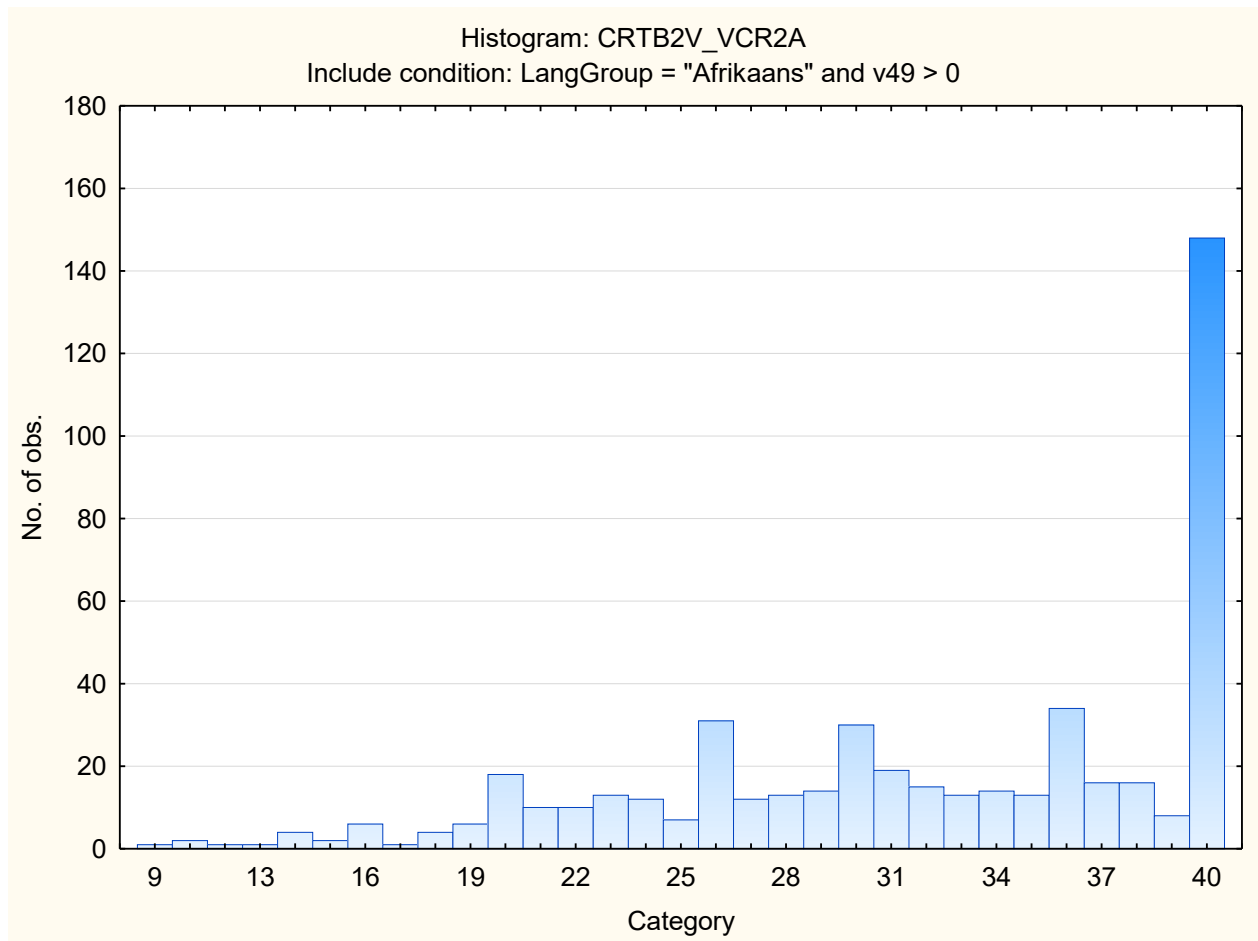
Frequency distribution: Numerical Critical Reasoning Items Attempted



Frequency distribution: Verbal Critical Reasoning Test



Frequency distribution: Verbal Critical Reasoning Items Attempted



Stanine table

	S9_1	S9_2	S9_3	S9_4	S9_5	S9_6	S9_7	S9_8	S9_9
NCR2 Numerical Critical Reasoning	0-3	4-5	6-7	8-10	11-12	13-15	16-17	18-19	20-24
NCR2 Items attempted	6-12	13-14	15-17	18-19	20-21	22-23	24-25		
VCR2 Verbal Critical Reasoning	2-6	7-9	10-12	13-16	17-19	20-22	23-25	26-29	30-37
VCR2 Items attempted	9-18	19-22	23-26	27-30	31-34	35-37	38-40		

Critical Reasoning Test Battery Norm Group: English speaking South Africans updated 2010

Sample composition

The sample consisted of South Africans with English as their home language, tested by Psytech South Africa and collaborators in the period up to January 2010. Not all respondents completed both the Verbal and Numerical Critical Reasoning Tests, therefore the biographical particulars are reported separately for the Numerical and Verbal Critical Reasoning tests.

Sample composition: Numerical Critical Reasoning Test

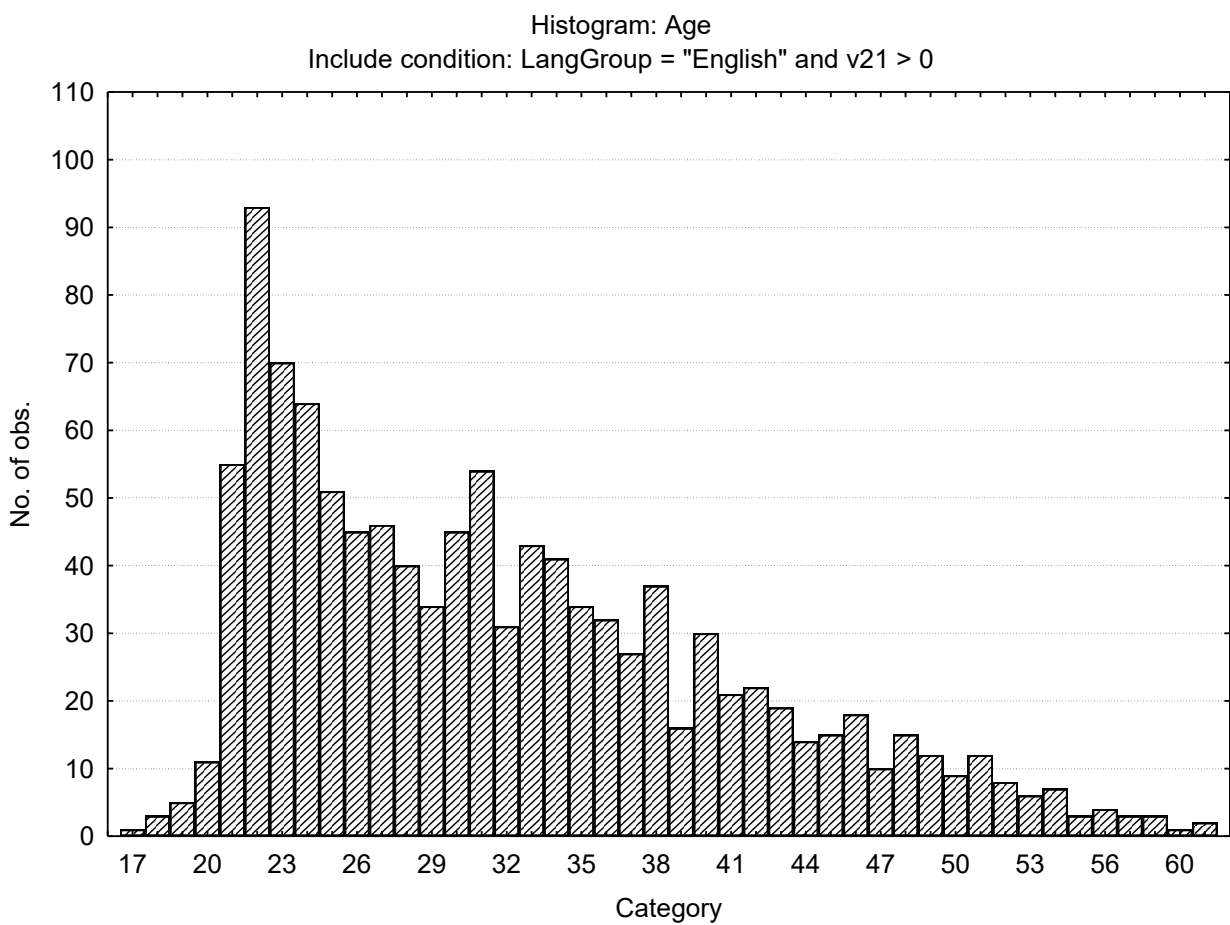
Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	853	853	74.36792	74.3679
F	287	1140	25.02180	99.3897
U	7	1147	0.61029	100.0000
Missing	0	1147	0.00000	100.0000

Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	219	219	19.09329	19.0933
Diploma	238	457	20.74978	39.8431
Grade 12	231	688	20.13949	59.9826
Degree	251	939	21.88317	81.8657
<Grade 12	17	956	1.48213	83.3479
Vocational Training	28	984	2.44115	85.7890
Missing	163	1147	14.21099	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Asian	419	419	36.53008	36.5301
European	553	972	48.21273	84.7428
African	56	1028	4.88230	89.6251

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Coloured	103	1131	8.97995	98.6051
Missing	16	1147	1.39494	100.0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	31.93975	9.092037	17.00000	62.00000	1112	35



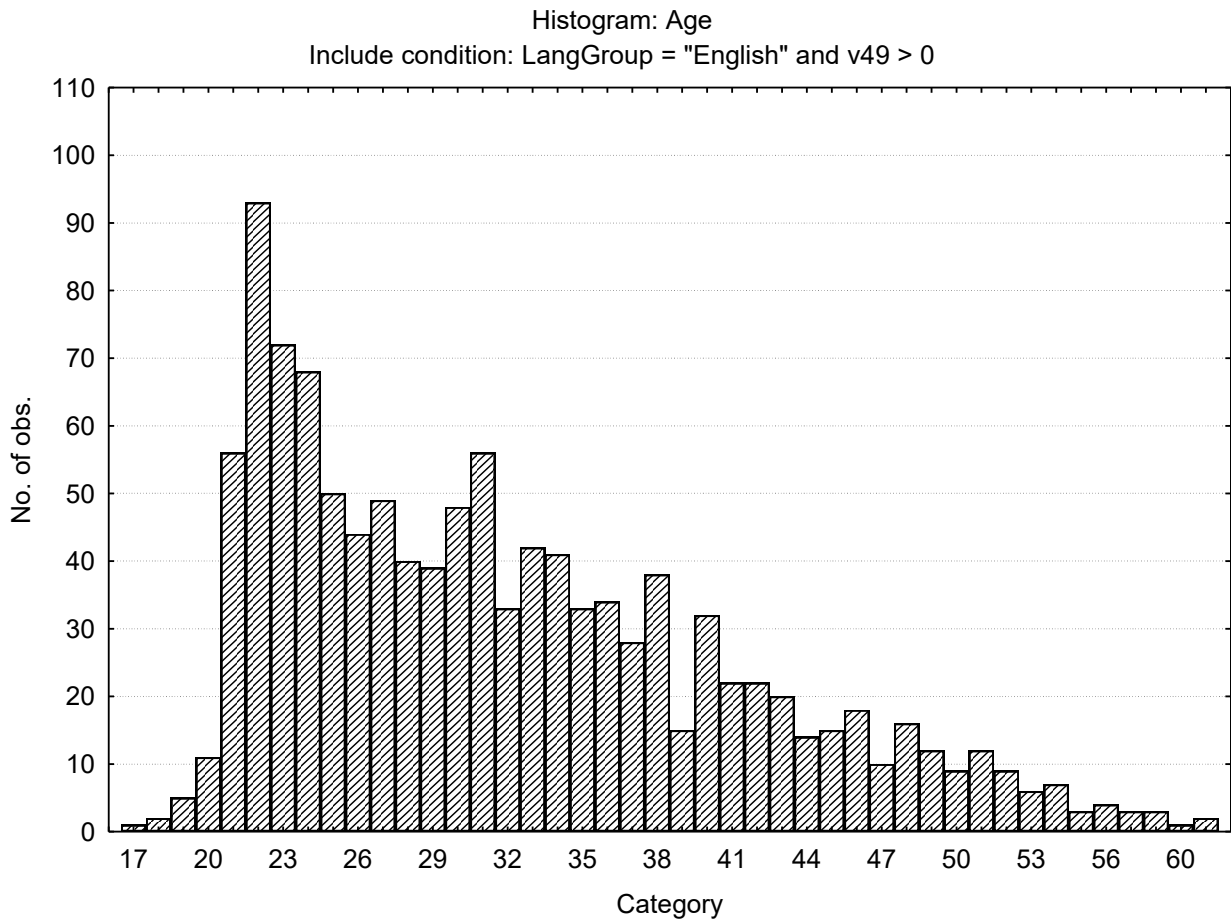
Sample composition: Verbal Critical Reasoning Tests

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
M	871	871	74.25405	74.2540
F	295	1166	25.14919	99.4032
U	7	1173	0.59676	100.0000
Missing	0	1173	0.00000	100.0000

Category	Frequency table: Education Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Post Graduate	237	237	20.20460	20.2046
Diploma	240	477	20.46036	40.6650
Grade 12	234	711	19.94885	60.6138
Degree	255	966	21.73913	82.3529
<Grade 12	16	982	1.36402	83.7170
Vocational Training	29	1011	2.47229	86.1893
Missing	162	1173	13.81074	100.0000

Category	Frequency table: Race Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Asian	425	425	36.23188	36.2319
European	571	996	48.67860	84.9105
African	57	1053	4.85934	89.7698
Coloured	104	1157	8.86616	98.6360
Missing	16	1173	1.36402	100.0000

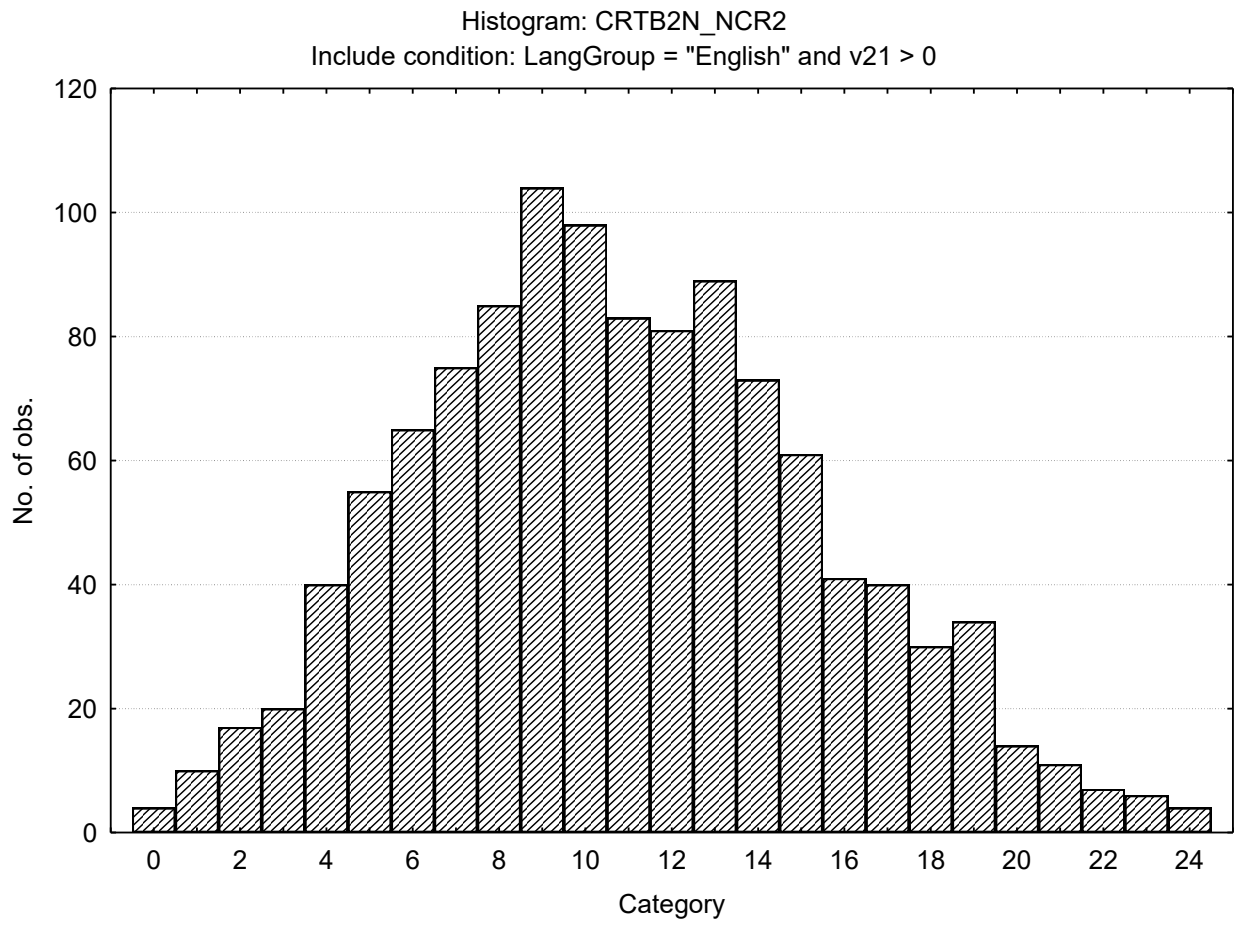
Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	31.94815	9.056353	17.00000	62.00000	1138	35



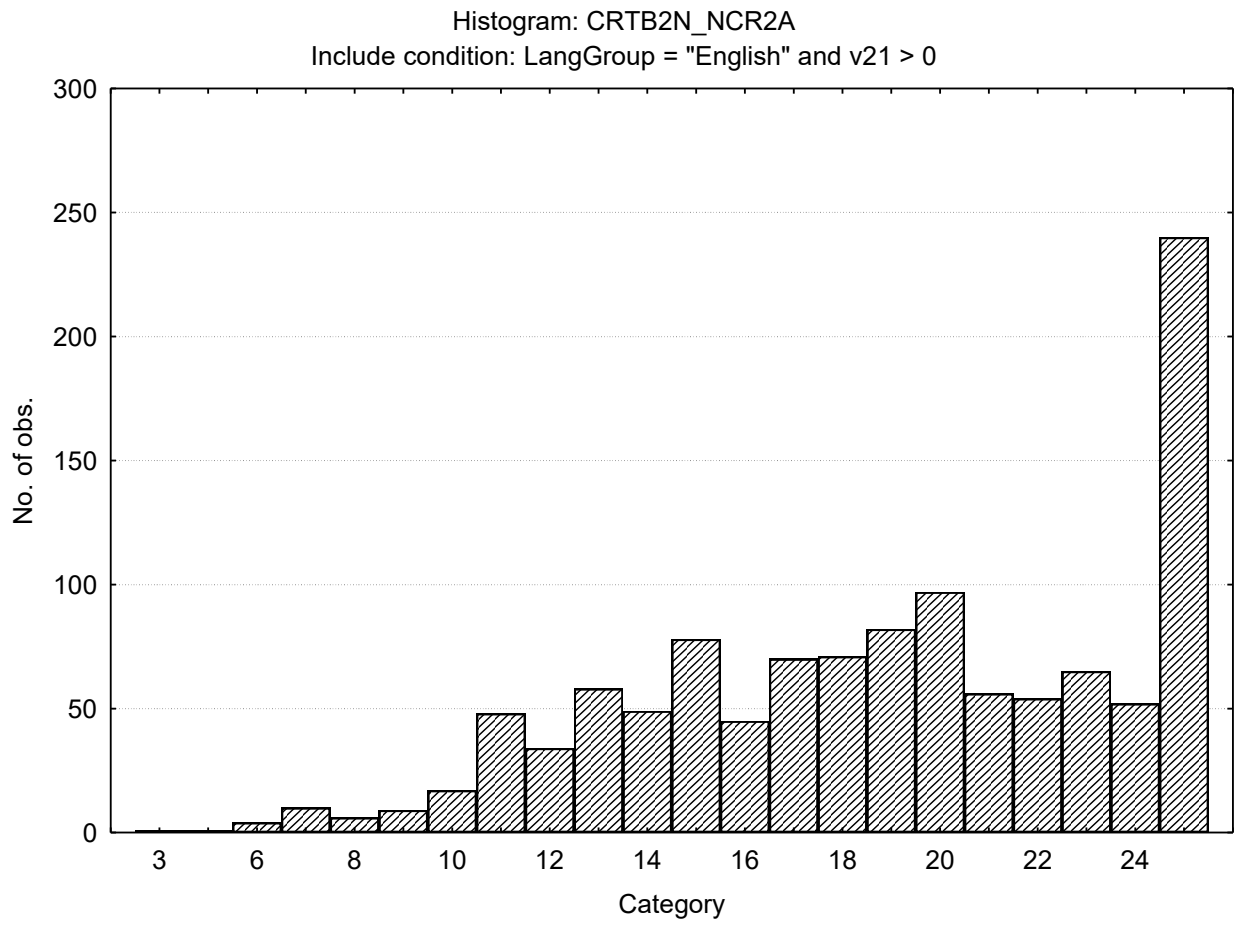
Descriptive statistics for Critical Reasoning Test Battery subtests

Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Numerical Critical Reasoning	10.85440	4.667167	0.000000	24.00000	1147	0
Numerical Critical Reasoning items attempted	18.95379	4.890650	3.000000	25.00000	1147	0
Verbal Critical Reasoning	17.86957	7.022213	2.000000	37.00000	1173	0
Verbal Critical Reasoning items attempted	30.28389	8.597388	8.000000	40.00000	1173	0

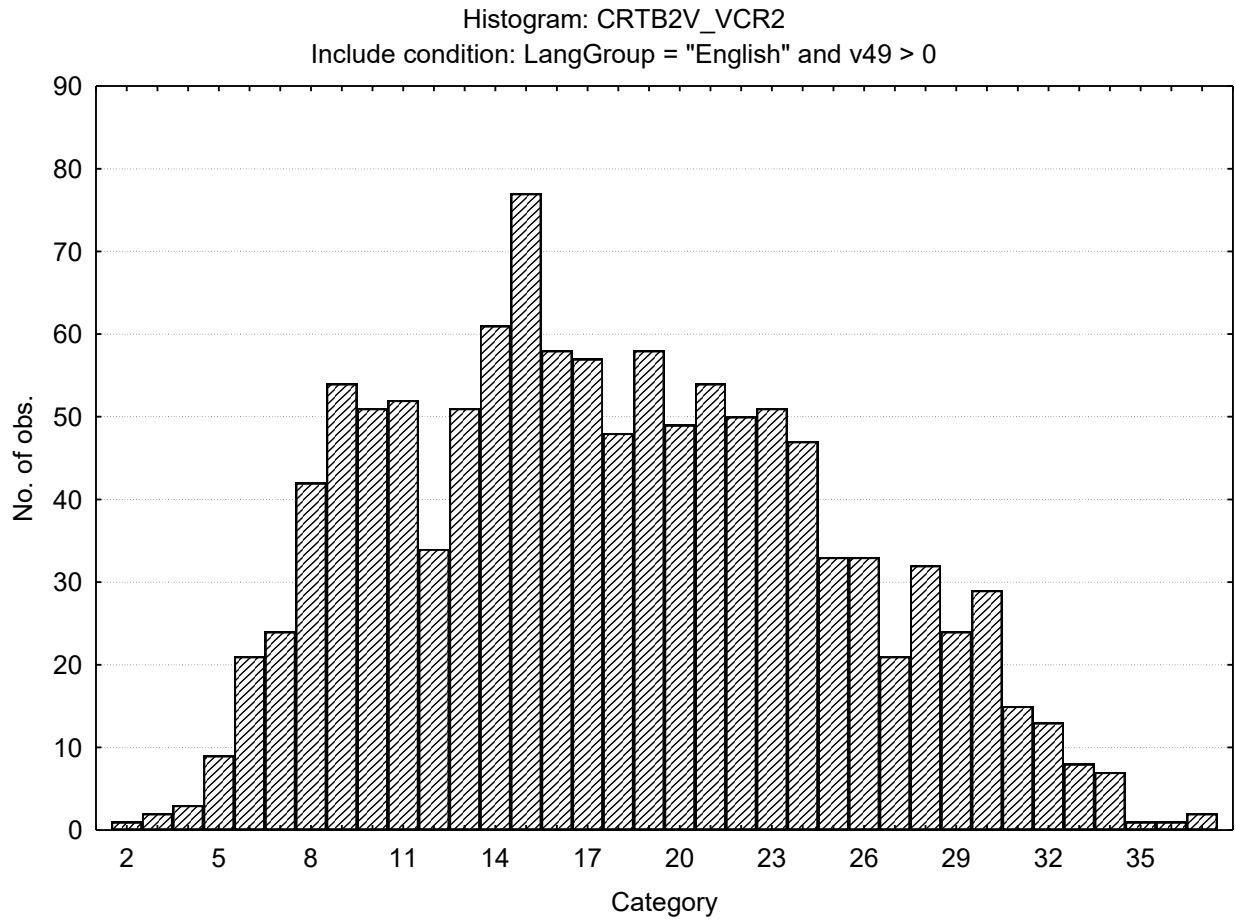
Frequency distribution: Numerical Critical Reasoning Test



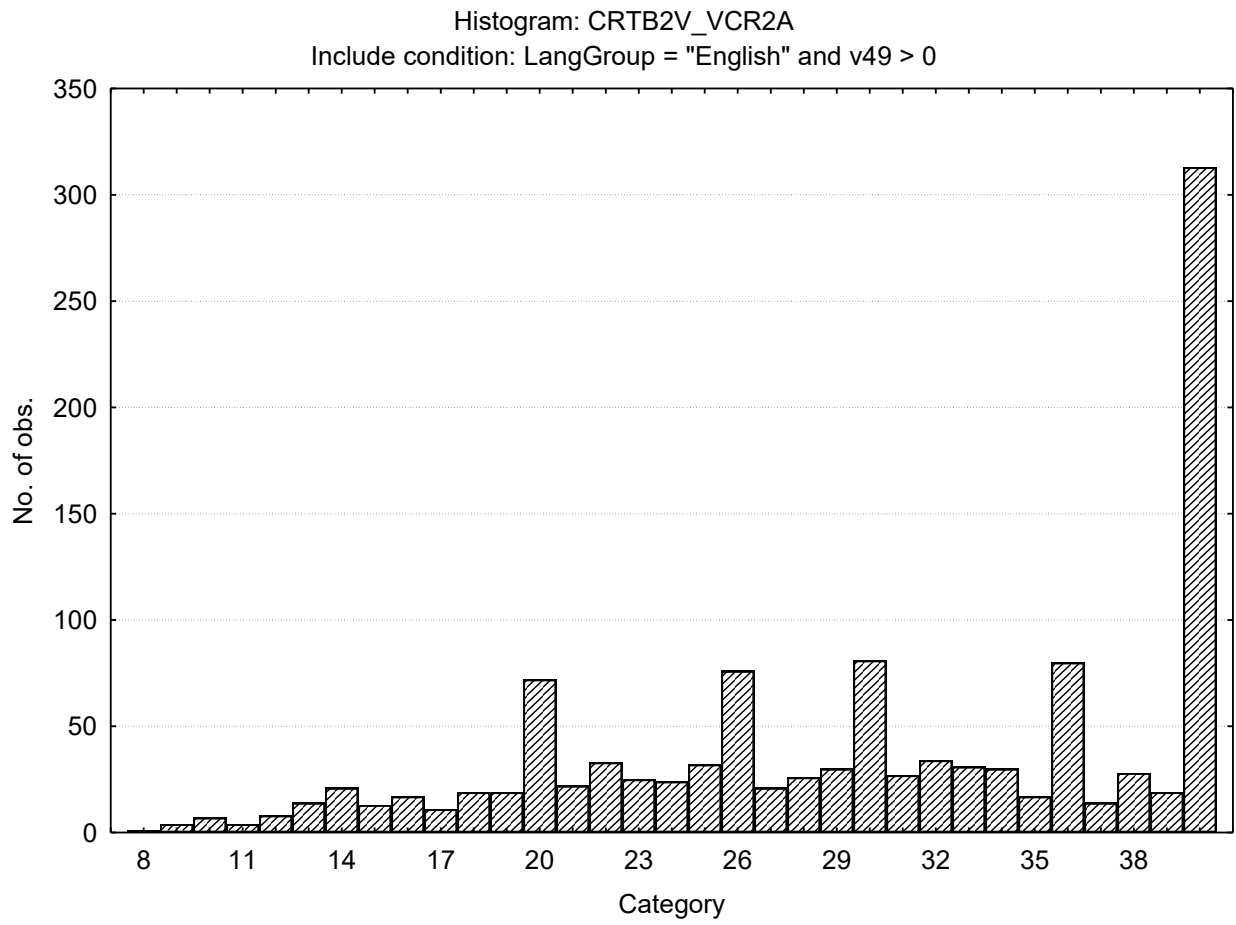
Frequency distribution: Numerical Critical Reasoning Test items attempted



Frequency distribution: Numerical Critical Reasoning Test



Frequency distribution: Numerical Critical Reasoning Test items attempted



Stanine table

	S9_1	S9_2	S9_3	S9_4	S9_5	S9_6	S9_7	S9_8	S9_9
NCR2 Numerical Critical Reasoning	0-2	3-5	6-7	8-9	10-12	13-14	15-16	17-19	20-24
NCR2 Items Attempted	3-10	11-12	13-15	16-17	18-20	21-22	23-25		
VCR2 Verbal Critical Reasoning	2-5	6-9	10-12	13-16	17-19	20-23	24-26	27-30	31-37
VCR2 Items Attempted	8-15	16-19	20-23	24-28	29-32	33-36	37-40		

Critical Reasoning Test (CRTB2)

Norm: South Africans, Aggregate Population, Updated 2016

Sample Composition

The sample consisted of South Africans tested by Psytech South Africa and collaborators during the period up to June 2015. Since not all respondents completed all the subtests of the Critical Reasoning Test Battery, biographical characteristics are reported separately for the different subtests.

Critical Numerical Reasoning Test: Biographical Composition

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	1547	1547	34,44667	34,4467
M	2910	4457	64,79626	99,2429
U	34	4491	0,75707	100,0000
Missing	0	4491	0,00000	100,0000

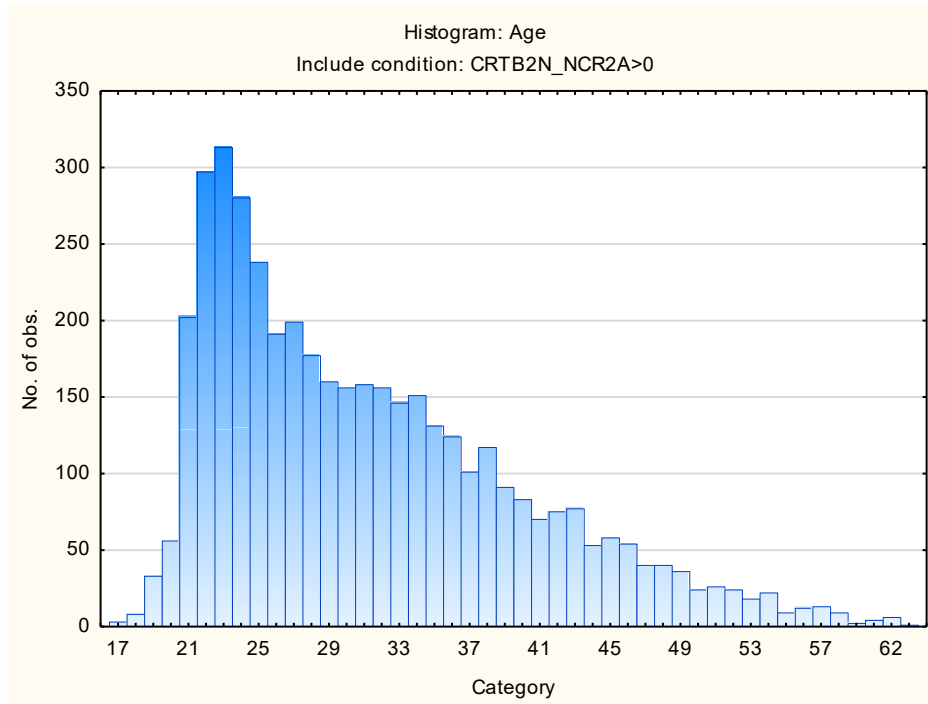
Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	1891	1891	42,10644	42,1064
Post Graduate	727	2618	16,18793	58,2944
Grade 12	664	3282	14,78513	73,0795
< Matric	38	3320	0,84614	73,9256
Missing	1171	4491	26,07437	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Xitsonga	58	58	1,29147	1,2915
English	1367	1425	30,43866	31,7301
Setswana	178	1603	3,96348	35,6936
Sesotho	245	1848	5,45536	41,1490
Sepedi	97	1945	2,15988	43,3088
Afrikaans	581	2526	12,93699	56,2458
isiXhosa	278	2804	6,19016	62,4360
isiZulu	436	3240	9,70831	72,1443
Tshivenda	63	3303	1,40281	73,5471
isiNdebele	17	3320	0,37853	73,9256
siSwati	22	3342	0,48987	74,4155
Missing	1149	4491	25,58450	100,0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	1394	1394	31,03986	31,0399
English	1367	2761	30,43866	61,4785
Afrikaans	581	3342	12,93699	74,4155
Missing	1149	4491	25,58450	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	1601	1601	35,64908	35,6491
Asian	514	2115	11,44511	47,0942
European	1244	3359	27,69984	74,7940
Coloured	167	3526	3,71855	78,5126
Missing	965	4491	21,48742	100,0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	31,24529	8,714224	17,00000	63,00000	4244	247



Critical Verbal Reasoning Test: Biographical Composition

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	1602	1602	34,22346	34,2235
M	3045	4647	65,05020	99,2737
U	34	4681	0,72634	100,0000
Missing	0	4681	0,00000	100,0000

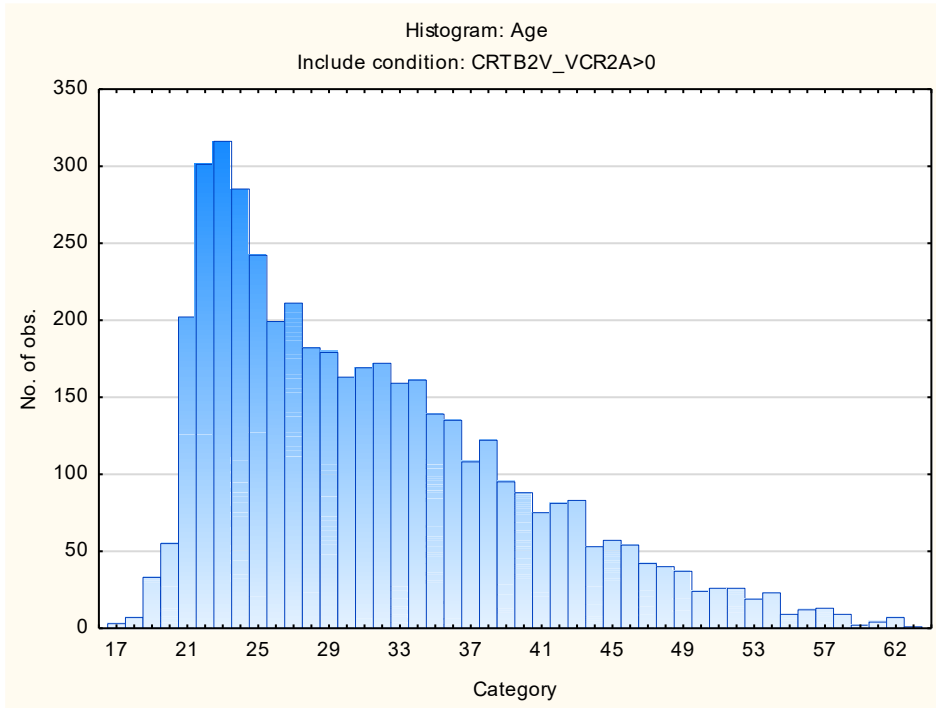
Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	1932	1932	41,27323	41,2732
Post Graduate	767	2699	16,38539	57,6586
Grade 12	658	3357	14,05683	71,7154
< Matric	38	3395	0,81179	72,5272
Missing	1286	4681	27,47276	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Xitsonga	59	59	1,26041	1,2604
English	1389	1448	29,67315	30,9336
Setswana	176	1624	3,75988	34,6934
Sesotho	246	1870	5,25529	39,9487
Sepedi	101	1971	2,15766	42,1064
Afrikaans	611	2582	13,05277	55,1592
isiXhosa	280	2862	5,98163	61,1408
isiZulu	436	3298	9,31425	70,4550
Tshivenda	64	3362	1,36723	71,8223
isiNdebele	17	3379	0,36317	72,1854
siSwati	22	3401	0,46999	72,6554
Missing	1280	4681	27,34458	100,0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	1401	1401	29,92950	29,9295
English	1389	2790	29,67315	59,6026
Afrikaans	611	3401	13,05277	72,6554
Missing	1280	4681	27,34458	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	1609	1609	34,37300	34,3730
Asian	520	2129	11,10874	45,4817
European	1292	3421	27,60094	73,0827
Coloured	167	3588	3,56761	76,6503
Missing	1093	4681	23,34971	100,0000

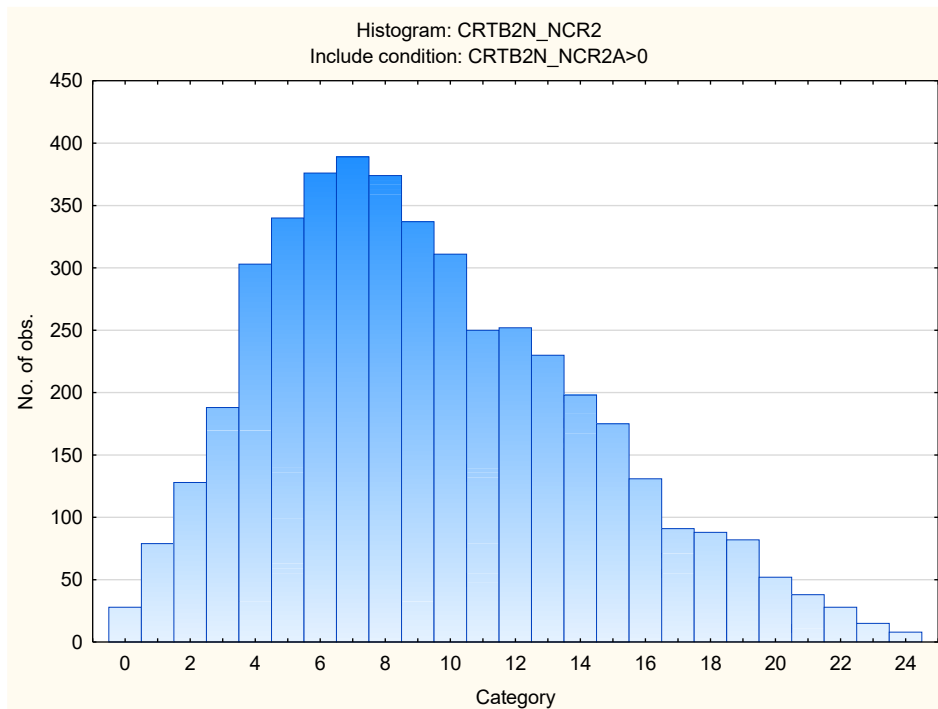
Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	31,32851	8,644202	17,00000	63,00000	4423	258

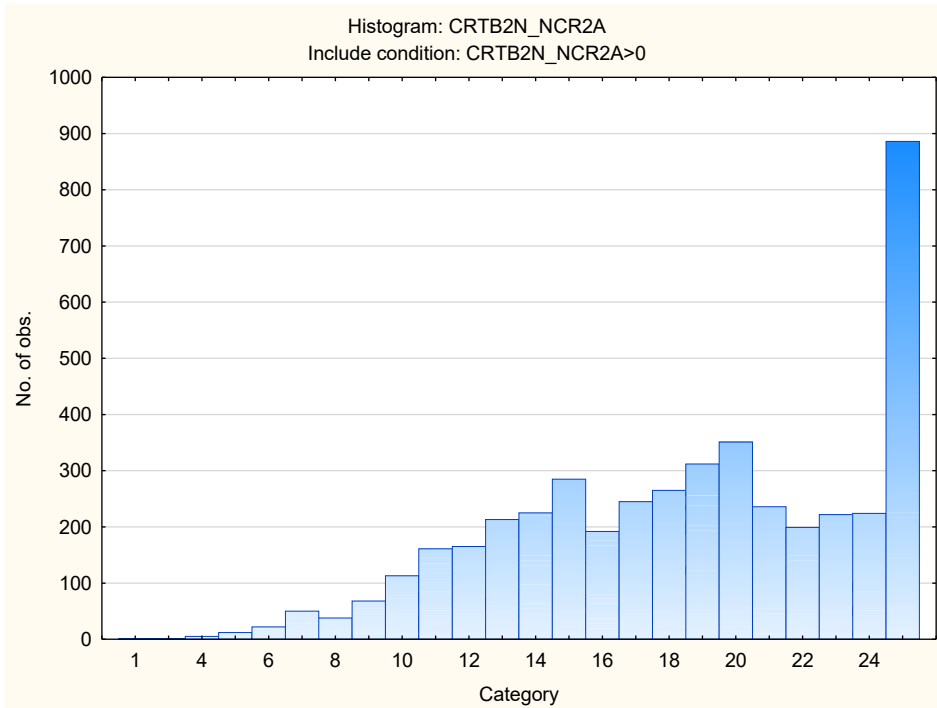


Descriptive statistics and frequency distributions on Critical Reasoning Test Battery subtests

Critical Numerical Reasoning Test

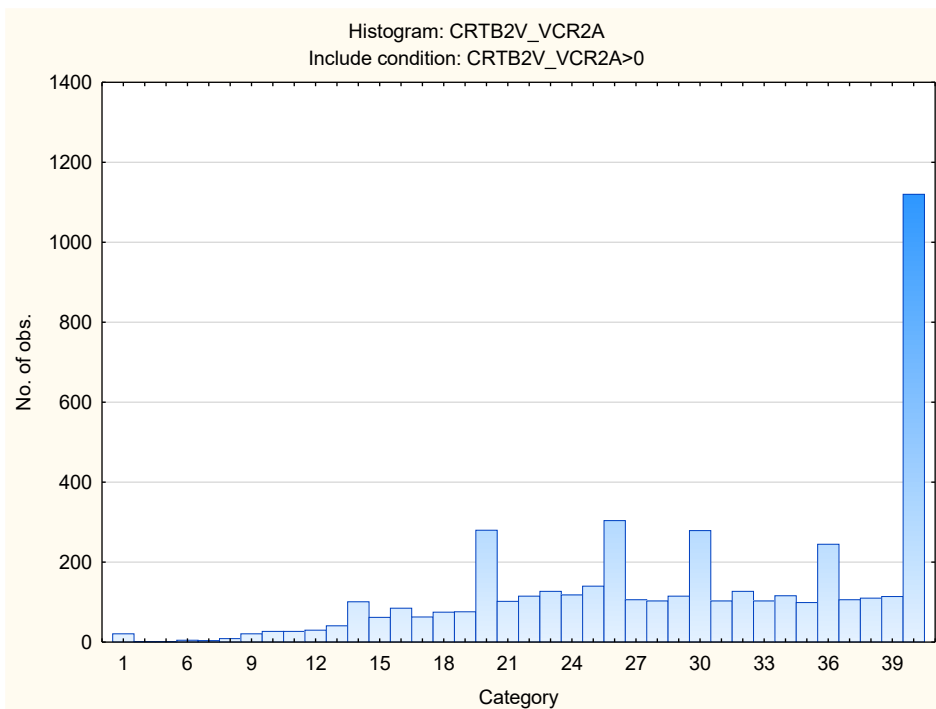
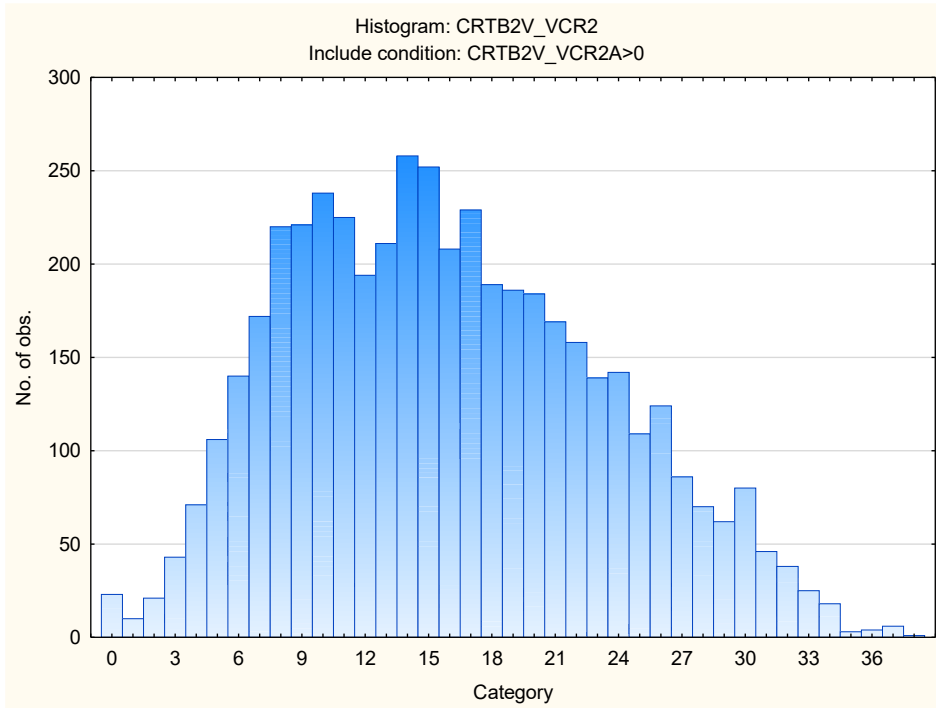
Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Critical Numerical Reasoning Test	9,32131	4,848377	0,000000	24,00000	4491	0
Critical Numerical Reasoning Items Attempted	18,58784	5,128897	1,000000	25,00000	4491	0





Critical Verbal Reasoning Test

Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Critical Verbal Reasoning Test	15,93463	7,368621	0,000000	38,00000	4681	0
Critical Verbal Reasoning Items Attempted	29,58535	8,989478	1,000000	40,00000	4681	0



Stanine table

Subtests	Stanine Groups								
	S9_1	S9_2	S9_3	S9_4	S9_5	S9_6	S9_7	S9_8	S9_9
Critical Verbal Reasoning	0-2	3-6	7-10	11-14	15-17	18-21	22-25	26-28	29-38
Critical Verbal Items Attempted	1-13	14-18	19-22	23-27	28-31	32-36	37-40		
Critical Numerical Reasoning	0-0	1-2	3-5	6-7	8-10	11-12	13-15	16-17	18-24
Critical Numerical Items Attempted	1-9	10-12	13-14	15-17	18-19	20-22	23-24	25-25	

Critical Reasoning Test (CRTB2)

Norm: South Africans, Afrikaans Language Group, Updated 2016

Sample Composition

The sample consisted of South Africans tested by Psytech South Africa and collaborators during the period up to June 2015. Since not all respondents completed all the subtests of the Critical Reasoning Test Battery, biographical characteristics are reported separately for the different subtests.

Critical Numerical Reasoning Test: Biographical Composition

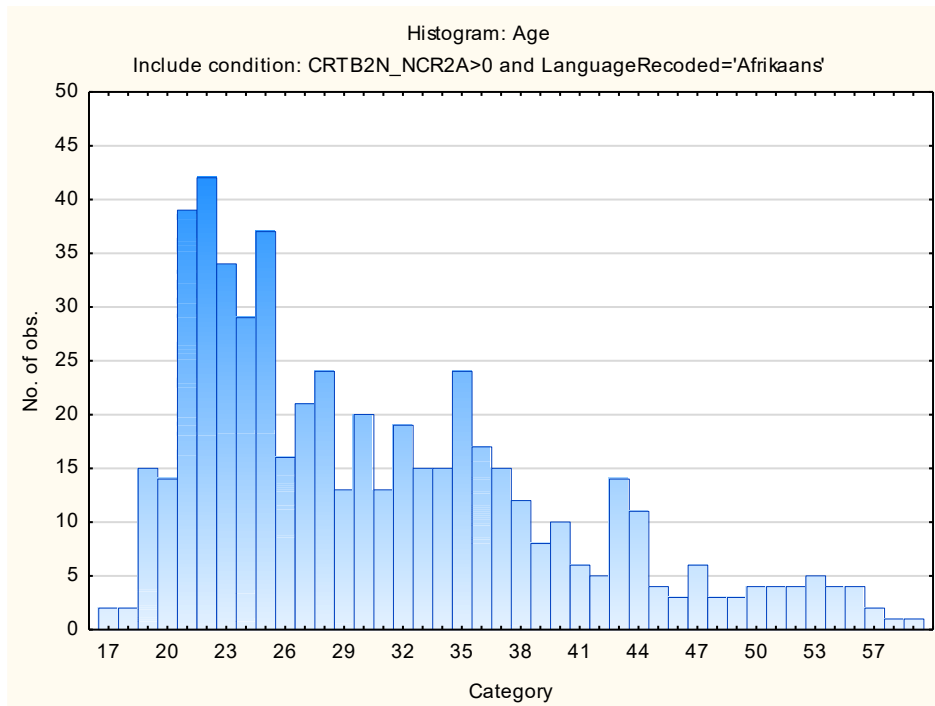
Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	219	219	37,69363	37,6936
M	358	577	61,61790	99,3115
U	4	581	0,68847	100,0000
Missing	0	581	0,00000	100,0000

Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	263	263	45,26678	45,2668
Post Graduate	102	365	17,55594	62,8227
Grade 12	149	514	25,64544	88,4682
< Matric	5	519	0,86059	89,3287
Missing	62	581	10,67126	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Afrikaans	581	581	100,0000	100,0000
Missing	0	581	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	12	12	2,06540	2,0654
European	521	533	89,67298	91,7384
Coloured	36	569	6,19621	97,9346
Missing	12	581	2,06540	100,0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	30,71481	9,236541	17,00000	62,00000	540	41



Critical Verbal Reasoning Test: Biographical Composition

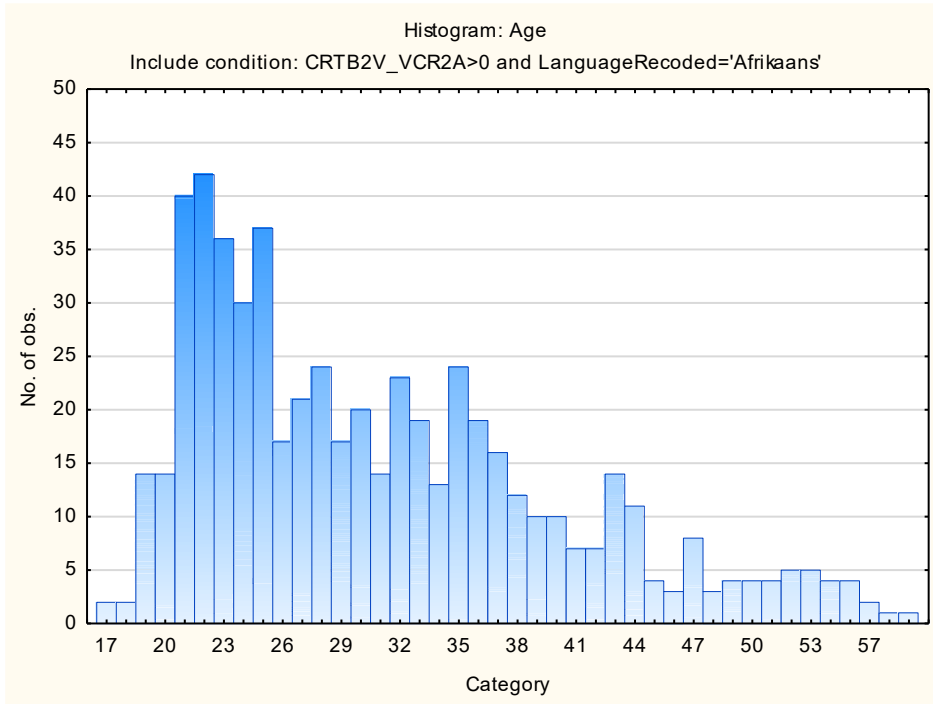
Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	226	226	36,98854	36,9885
M	382	608	62,52046	99,5090
U	3	611	0,49100	100,0000
Missing	0	611	0,00000	100,0000

Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	284	284	46,48118	46,4812
Post Graduate	114	398	18,65794	65,1391
Grade 12	146	544	23,89525	89,0344
< Matric	6	550	0,98200	90,0164
Missing	61	611	9,98363	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Afrikaans	611	611	100,0000	100,0000
Missing	0	611	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	14	14	2,29133	2,2913
European	549	563	89,85270	92,1440
Coloured	36	599	5,89198	98,0360
Missing	12	611	1,96399	100,0000

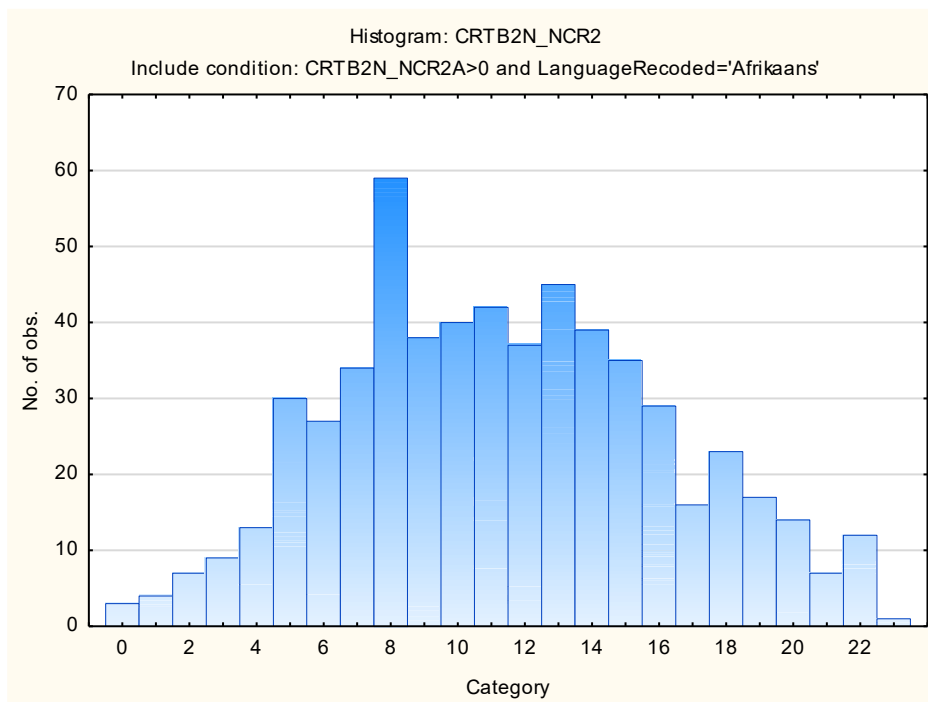
Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	30,91711	9,212174	17,00000	62,00000	567	44

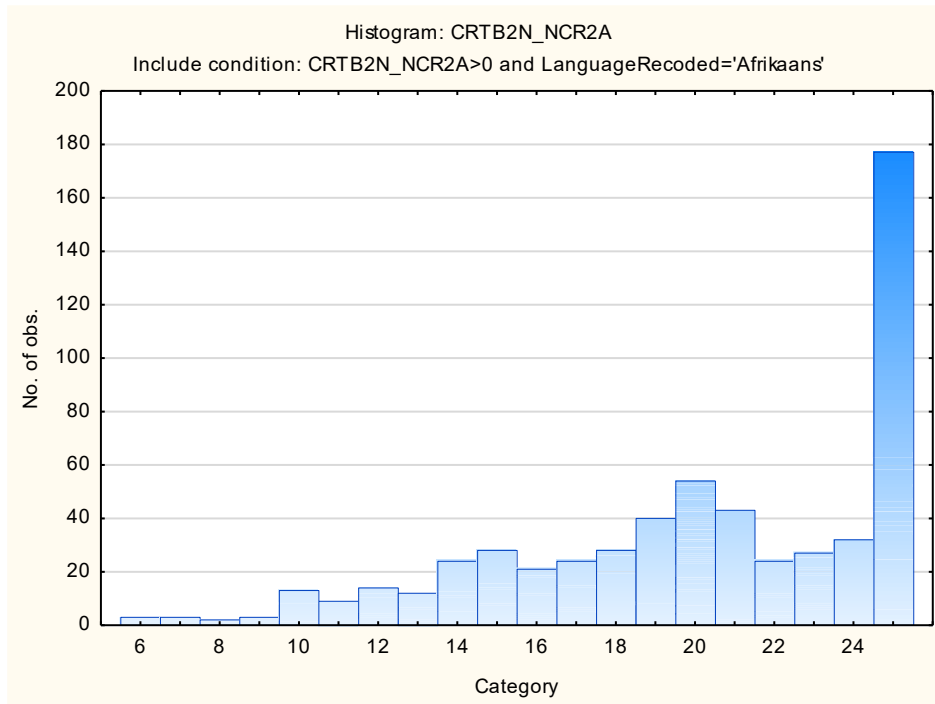


Descriptive statistics and frequency distributions on Critical Reasoning Test Battery subtests

Critical Numerical Reasoning Test

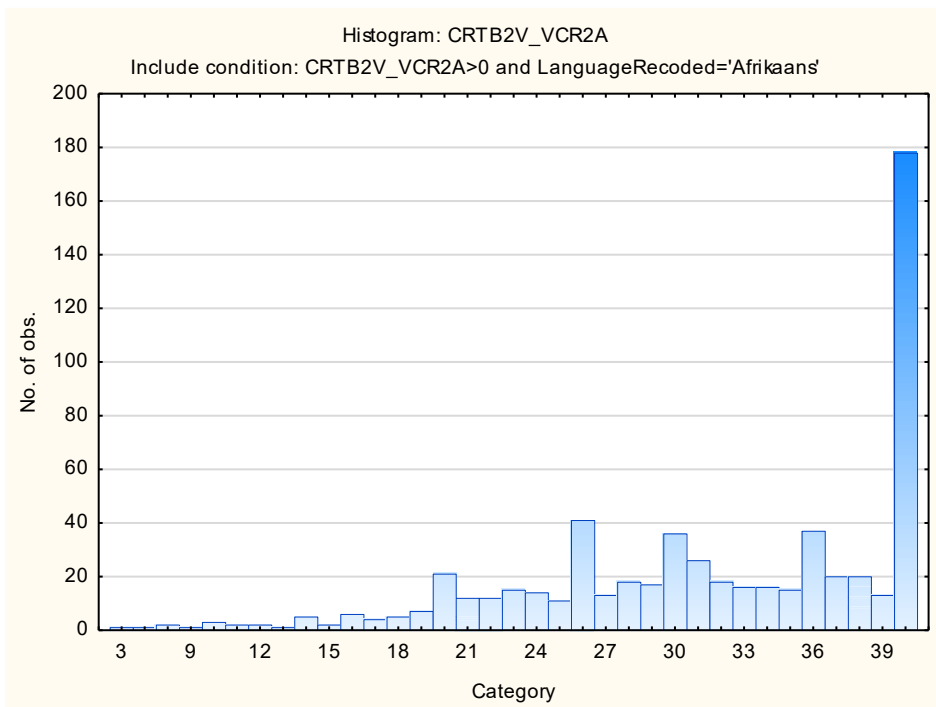
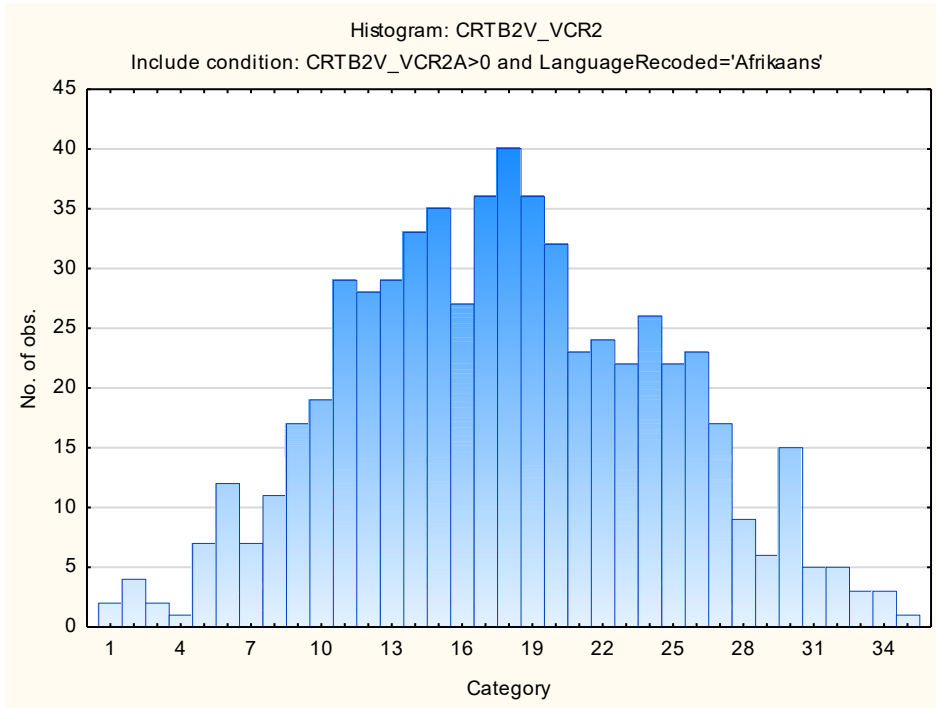
Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Critical Numerical Reasoning Test	11,37866	4,838904	0,000000	24,00000	581	0
Critical Numerical Reasoning Items Attempted	20,17900	4,702784	6,000000	25,00000	581	0





Critical Verbal Reasoning Test

Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Critical Verbal Reasoning Test	17,82488	6,702613	1,000000	37,00000	611	0
Critical Verbal Reasoning Items Attempted	31,80360	7,929860	3,000000	40,00000	611	0



Stanine table

Subtests	Stanine Groups								
	S9_1	S9_2	S9_3	S9_4	S9_5	S9_6	S9_7	S9_8	S9_9
Critical Verbal Reasoning	0-5	6-9	10-12	13-16	17-19	20-22	23-26	27-29	30-37
Critical Verbal Items Attempted	3-17	18-21	22-25	26-29	30-33	34-37	38-40		
Critical Numerical Reasoning	0-2	3-4	5-7	8-9	10-12	13-14	15-17	18-20	21-24
Critical Numerical Items Attempted	6-11	12-14	15-16	17-19	20-21	22-23	24-25		

Critical Reasoning Test (CRTB2)

Norm: South Africans, English Language Group, updated 2016

Sample Composition

The sample consisted of South Africans tested by Psytech South Africa and collaborators during the period up to June 2015. Since not all respondents completed all the subtests of the Critical Reasoning Test Battery, biographical characteristics are reported separately for the different subtests.

Critical Numerical Reasoning Test: Biographical Composition

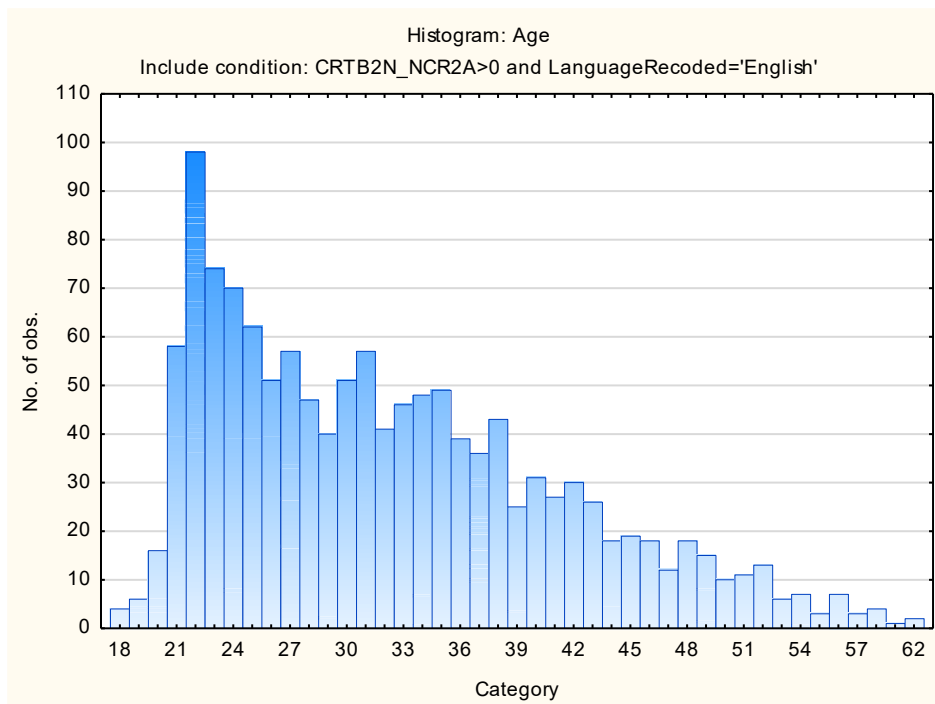
Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	386	386	28,23702	28,2370
M	973	1359	71,17776	99,4148
U	8	1367	0,58522	100,0000
Missing	0	1367	0,00000	100,0000

Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	577	577	42,20922	42,2092
Post Graduate	287	864	20,99488	63,2041
Grade 12	326	1190	23,84784	87,0519
< Matric	22	1212	1,60936	88,6613
Missing	155	1367	11,33870	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
English	1367	1367	100,0000	100,0000
Missing	0	1367	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	91	91	6,65691	6,6569
Asian	460	551	33,65033	40,3072
European	671	1222	49,08559	89,3928
Coloured	124	1346	9,07096	98,4638
Missing	21	1367	1,53621	100,0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	32,26482	9,056785	18,00000	62,00000	1299	68



Critical Verbal Reasoning Test: Biographical Composition

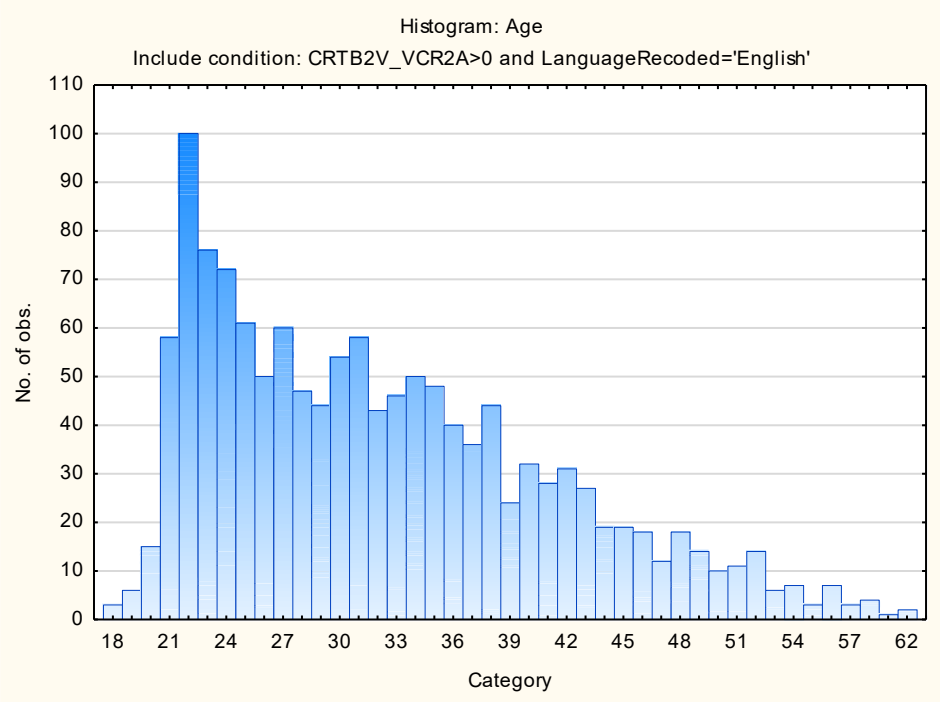
Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	396	396	28,50972	28,5097
M	985	1381	70,91433	99,4240
U	8	1389	0,57595	100,0000
Missing	0	1389	0,00000	100,0000

Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	582	582	41,90065	41,9006
Post Graduate	303	885	21,81425	63,7149
Grade 12	329	1214	23,68611	87,4010
< Matric	21	1235	1,51188	88,9129
Missing	154	1389	11,08711	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
English	1389	1389	100,0000	100,0000
Missing	0	1389	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	91	91	6,55148	6,5515
Asian	466	557	33,54932	40,1008
European	689	1246	49,60403	89,7048
Coloured	123	1369	8,85529	98,5601
Missing	20	1389	1,43988	100,0000

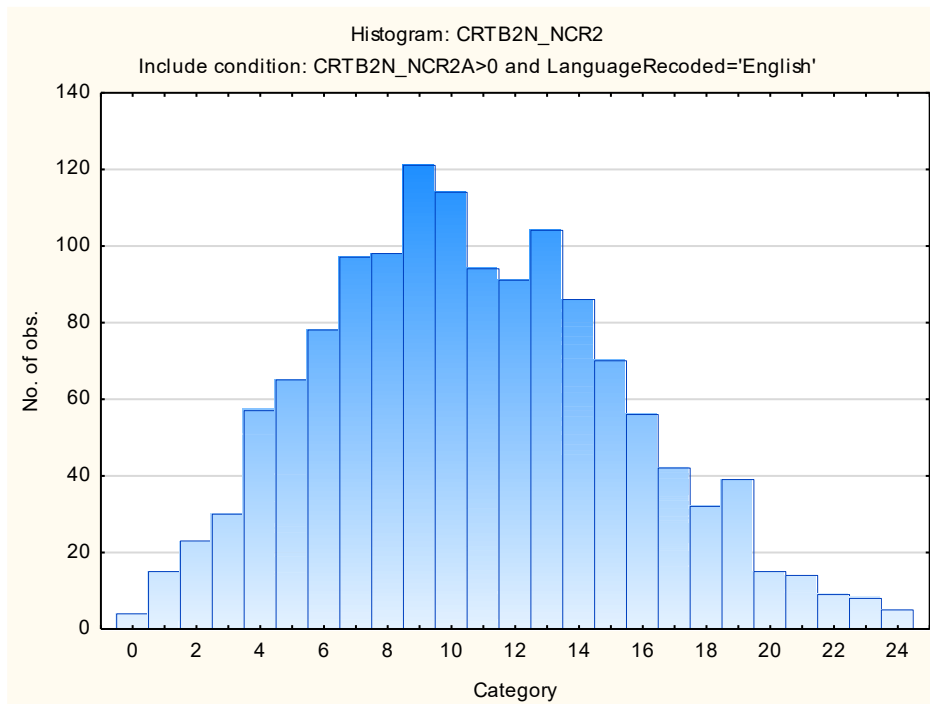
Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	32,26646	9,015063	18,00000	62,00000	1321	68

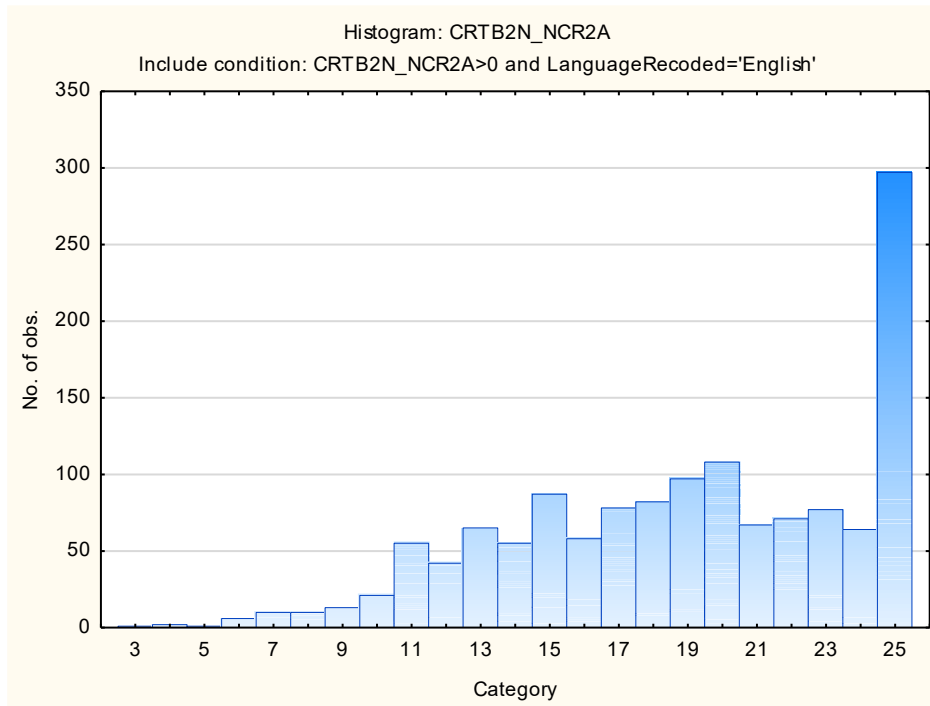


Descriptive statistics and frequency distributions on Critical Reasoning Test Battery subtests

Critical Numerical Reasoning Test

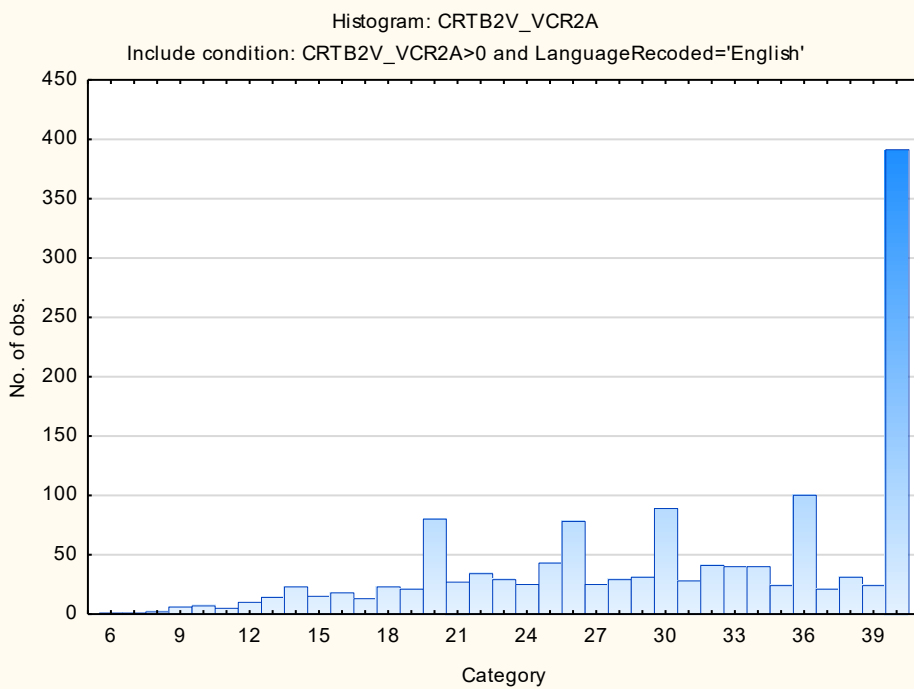
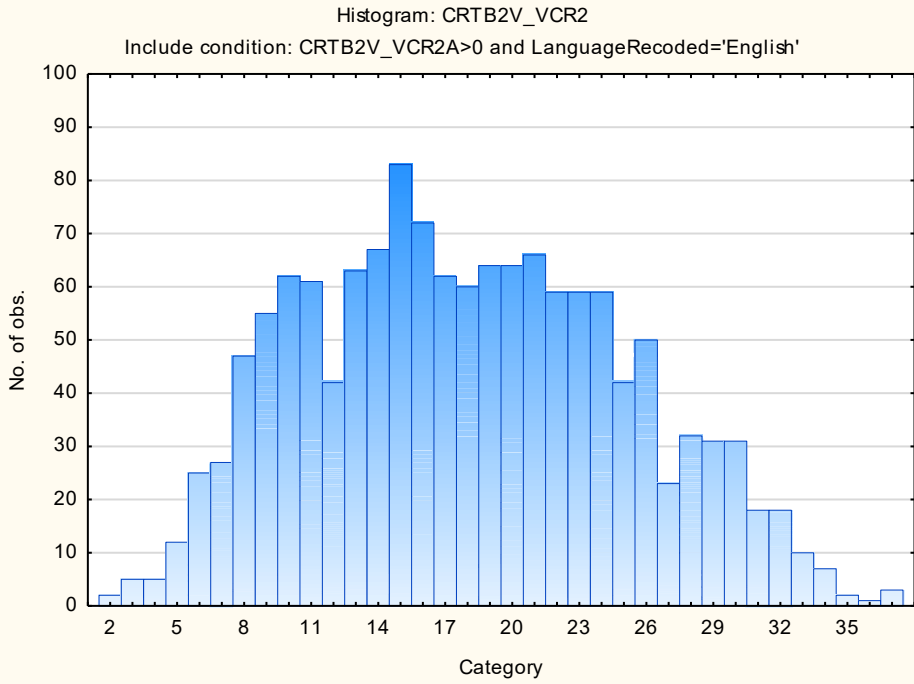
Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Critical Numerical Reasoning Test	10,69422	4,750910	0,000000	24,00000	1367	0
Critical Numerical Reasoning Items Attempted	19,01390	4,967444	3,000000	25,00000	1367	0





Critical Verbal Reasoning Test

Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Critical Verbal Reasoning Test	17,96976	7,074568	2,000000	37,00000	1389	0
Critical Verbal Reasoning Items Attempted	30,63427	8,644442	6,000000	40,00000	1389	0



Stanine table

Subtests	Stanine Groups								
	S9_1	S9_2	S9_3	S9_4	S9_5	S9_6	S9_7	S9_8	S9_9
Critical Verbal Reasoning	0-5	6-8	9-12	13-16	17-19	20-23	24-26	27-30	31-37
Critical Verbal Items Attempted	6-15	16-19	20-24	25-28	29-32	33-37	38-40		
Critical Numerical Reasoning	0-1	2-4	5-6	7-9	10-11	12-14	15-16	17-19	20-24
Critical Numerical Items Attempted	3-10	11-12	13-15	16-17	18-20	21-22	23-25		

Critical Reasoning Test (CRTB2)

Norm: South Africans, isiXhosa Language Group, Updated 2016

Sample Composition

The sample consisted of South Africans tested by Psytech South Africa and collaborators during the period up to June 2015. Since not all respondents completed all the subtests of the Critical Reasoning Test Battery, biographical characteristics are reported separately for the different subtests.

Critical Numerical Reasoning Test: Biographical Composition

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	114	114	41,00719	41,0072
M	163	277	58,63309	99,6403
U	1	278	0,35971	100,0000
Missing	0	278	0,00000	100,0000

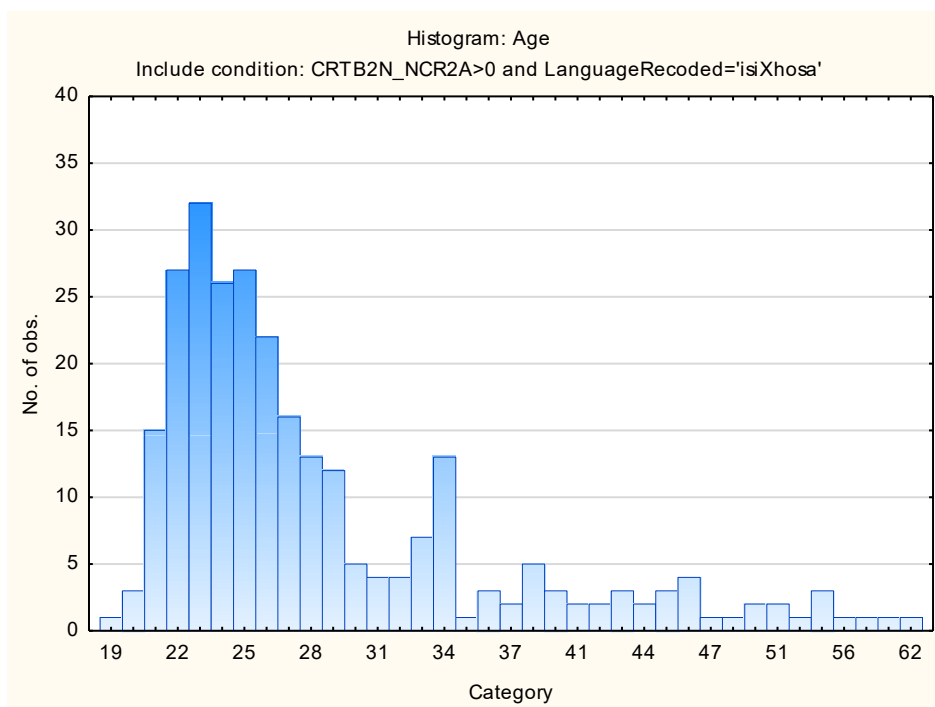
Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	195	195	70,14388	70,1439
Post Graduate	59	254	21,22302	91,3669
Grade 12	12	266	4,31655	95,6835
Missing	12	278	4,31655	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
isiXhosa	278	278	100,0000	100,0000
Missing	0	278	0,0000	100,0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	278	278	100,0000	100,0000
Missing	0	278	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	273	273	98,20144	98,2014
Asian	2	275	0,71942	98,9209
European	2	277	0,71942	99,6403
Missing	1	278	0,35971	100,0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	28,70849	8,260116	19,00000	62,00000	271	7



Critical Verbal Reasoning Test: Biographical Composition

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	116	116	41,42857	41,4286
M	163	279	58,21429	99,6429
U	1	280	0,35714	100,0000
Missing	0	280	0,00000	100,0000

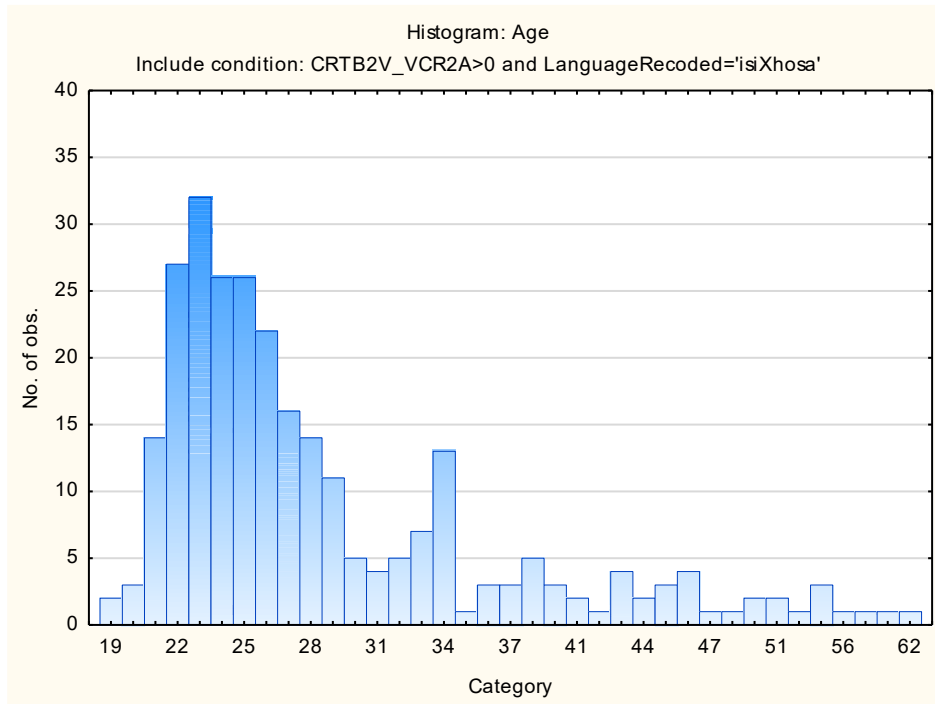
Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	198	198	70,71429	70,7143
Post Graduate	59	257	21,07143	91,7857
Grade 12	10	267	3,57143	95,3571
< Matric	1	268	0,35714	95,7143
Missing	12	280	4,28571	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
isiXhosa	280	280	100,0000	100,0000
Missing	0	280	0,0000	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	280	280	100,0000	100,0000
Missing	0	280	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	273	273	97,50000	97,5000
Asian	3	276	1,07143	98,5714
European	2	278	0,71429	99,2857
Coloured	1	279	0,35714	99,6429
Missing	1	280	0,35714	100,0000

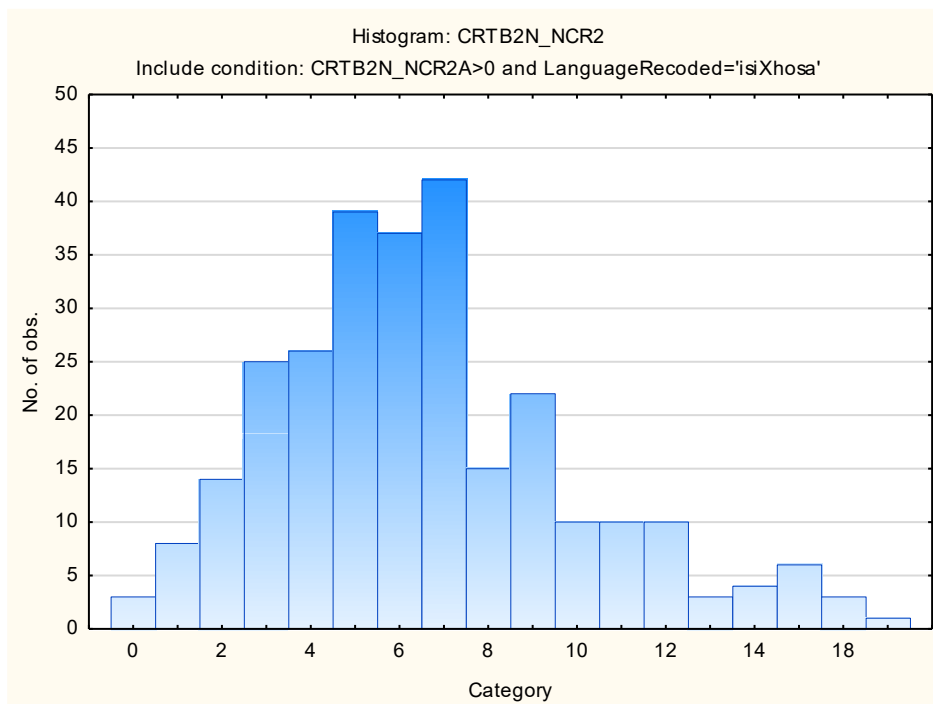
Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	28,75735	8,273459	19,00000	62,00000	272	8

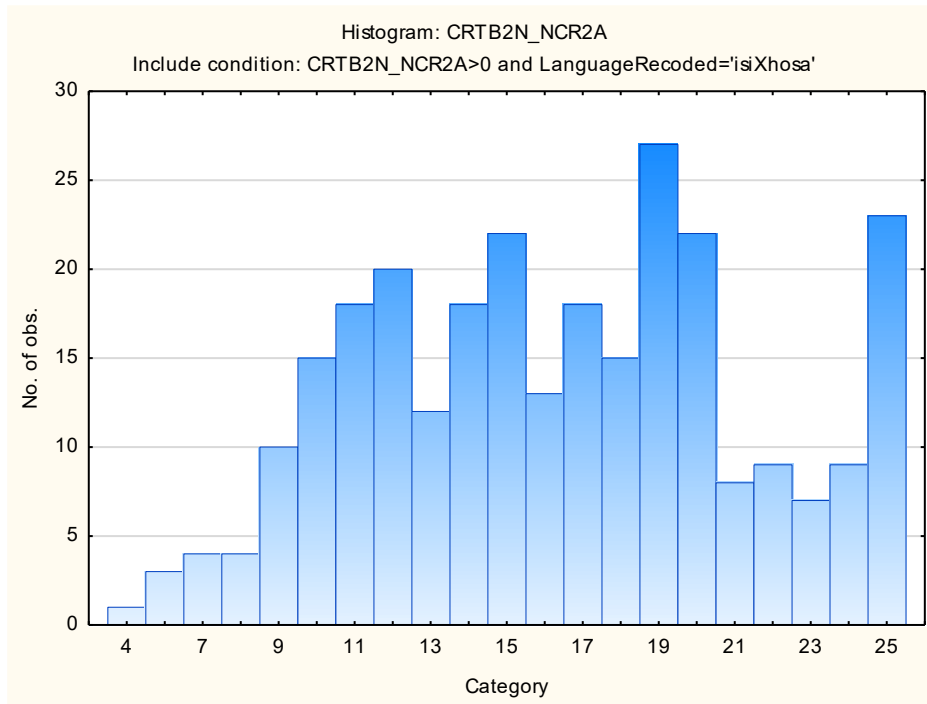


Descriptive statistics and frequency distributions on Critical Reasoning Test Battery subtests

Critical Numerical Reasoning Test

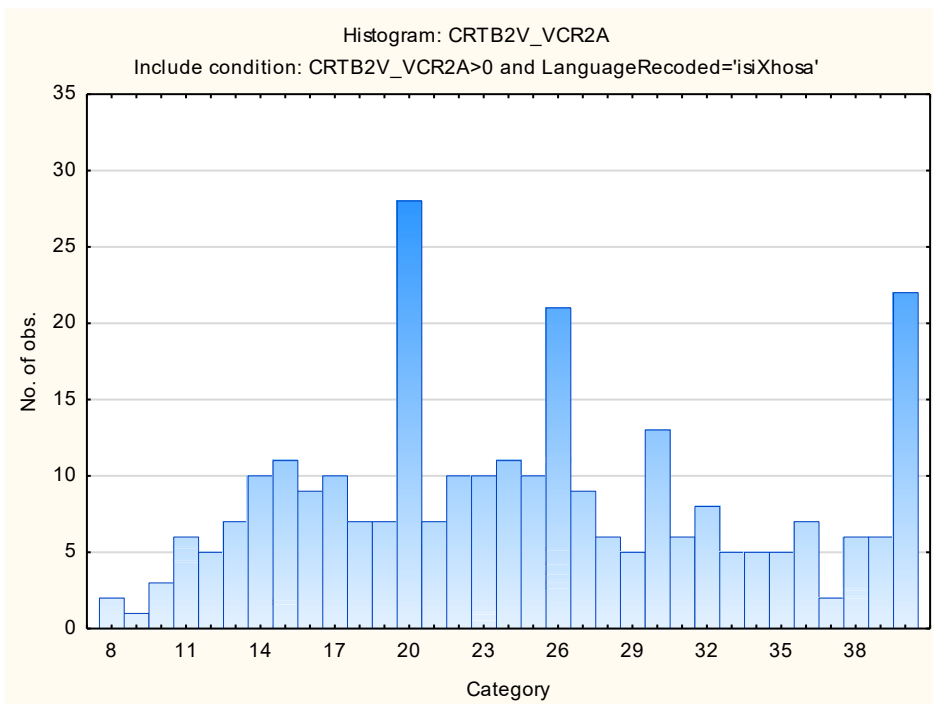
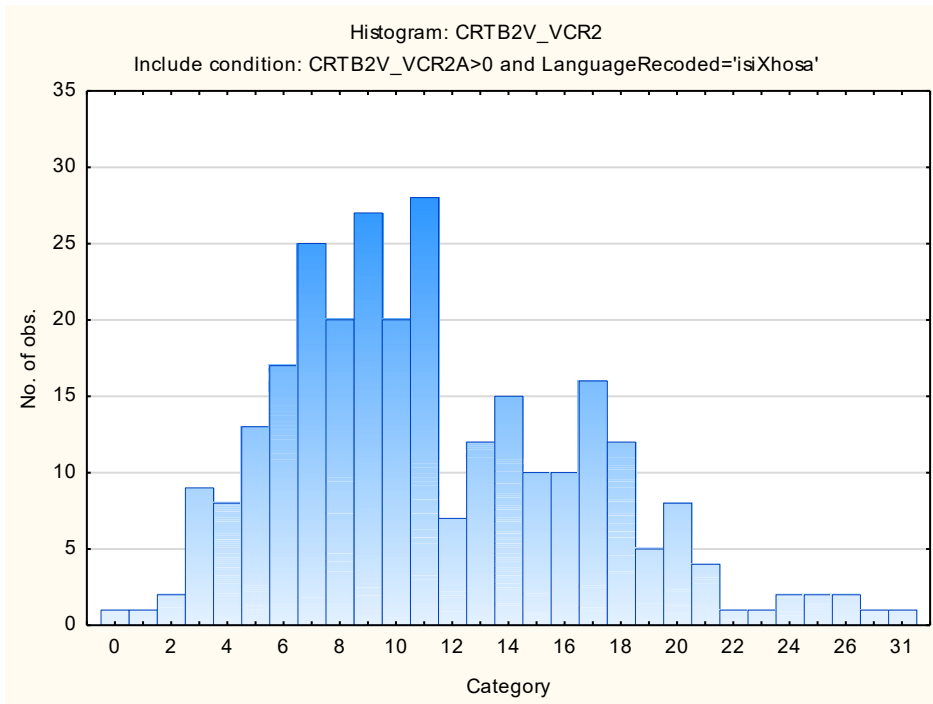
Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Critical Numerical Reasoning Test	6,59353	3,497843	0,000000	20,00000	278	0
Critical Numerical Reasoning Items Attempted	16,37770	5,014543	4,000000	25,00000	278	0





Critical Verbal Reasoning Test

Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Critical Verbal Reasoning Test	11,27500	5,409346	0,000000	31,00000	280	0
Critical Verbal Reasoning Items Attempted	24,76071	8,545255	8,000000	40,00000	280	0



Stanine table

Subtests	Stanine Groups								
	S9_1	S9_2	S9_3	S9_4	S9_5	S9_6	S9_7	S9_8	S9_9
Critical Verbal Reasoning	0-1	2-4	5-7	8-9	10-12	13-15	16-18	19-20	21-31
Critical Verbal Items Attempted	8-9	10-14	15-18	19-22	23-26	27-31	32-35	36-39	40-40
Critical Numerical Reasoning	0-0	1-2	3-3	4-5	6-7	8-9	10-10	11-12	13-20
Critical Numerical Items Attempted	4-7	8-10	11-12	13-15	16-17	18-20	21-22	23-25	

Critical Reasoning Test (CRTB2)

Norm: South Africans, isiZulu Language Group, Updated 2016

Sample Composition

The sample consisted of South Africans tested by Psytech South Africa and collaborators during the period up to June 2015. Since not all respondents completed all the subtests of the Critical Reasoning Test Battery, biographical characteristics are reported separately for the different subtests.

Critical Numerical Reasoning Test: Biographical Composition

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	160	160	36,69725	36,6972
M	275	435	63,07339	99,7706
U	1	436	0,22936	100,0000
Missing	0	436	0,00000	100,0000

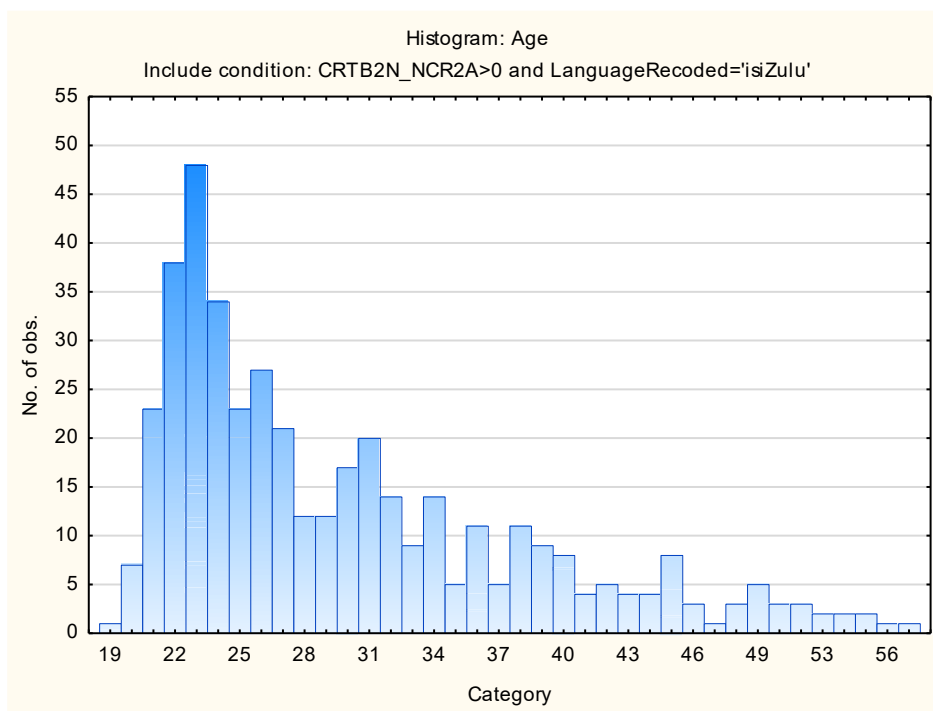
Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	265	265	60,77982	60,7798
Post Graduate	78	343	17,88991	78,6697
Grade 12	57	400	13,07339	91,7431
< Matric	8	408	1,83486	93,5780
Missing	28	436	6,42202	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
isiZulu	436	436	100,0000	100,0000
Missing	0	436	0,0000	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	436	436	100,0000	100,0000
Missing	0	436	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	431	431	98,85321	98,8532
Asian	2	433	0,45872	99,3119
European	2	435	0,45872	99,7706
Missing	1	436	0,22936	100,0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	29,80714	8,327053	19,00000	58,00000	420	16



Critical Verbal Reasoning Test: Biographical Composition

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	158	158	36,23853	36,2385
M	278	436	63,76147	100,0000
Missing	0	436	0,00000	100,0000

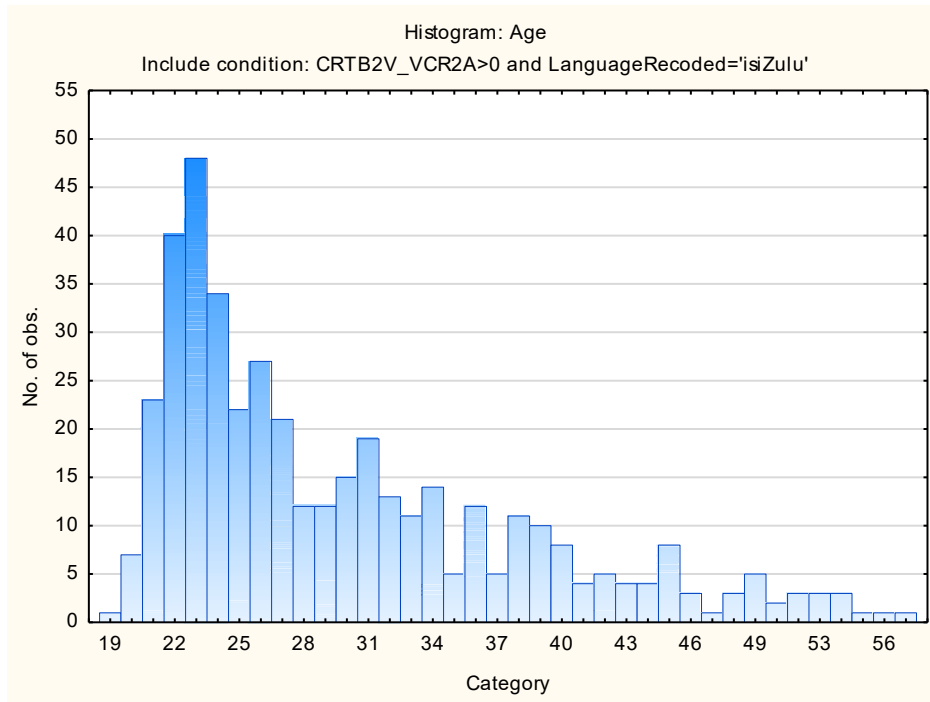
Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	266	266	61,00917	61,0092
Post Graduate	80	346	18,34862	79,3578
Grade 12	57	403	13,07339	92,4312
< Matric	7	410	1,60550	94,0367
Missing	26	436	5,96330	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
isiZulu	436	436	100,0000	100,0000
Missing	0	436	0,0000	100,0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	436	436	100,0000	100,0000
Missing	0	436	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	431	431	98,85321	98,8532
Asian	2	433	0,45872	99,3119
European	2	435	0,45872	99,7706
Missing	1	436	0,22936	100,0000

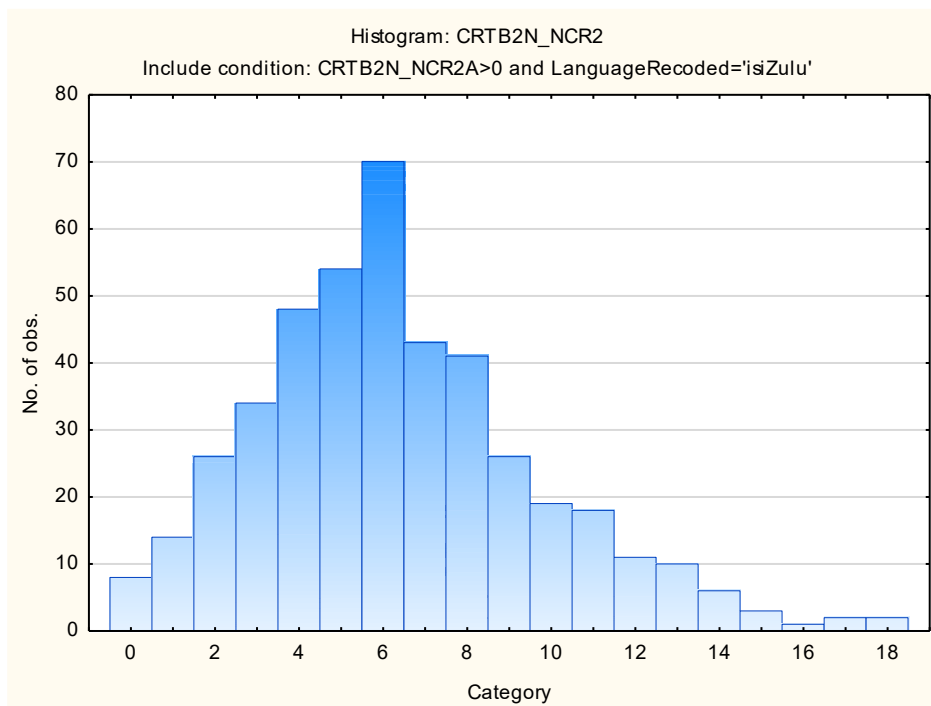
Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	29,82898	8,362286	19,00000	58,00000	421	15

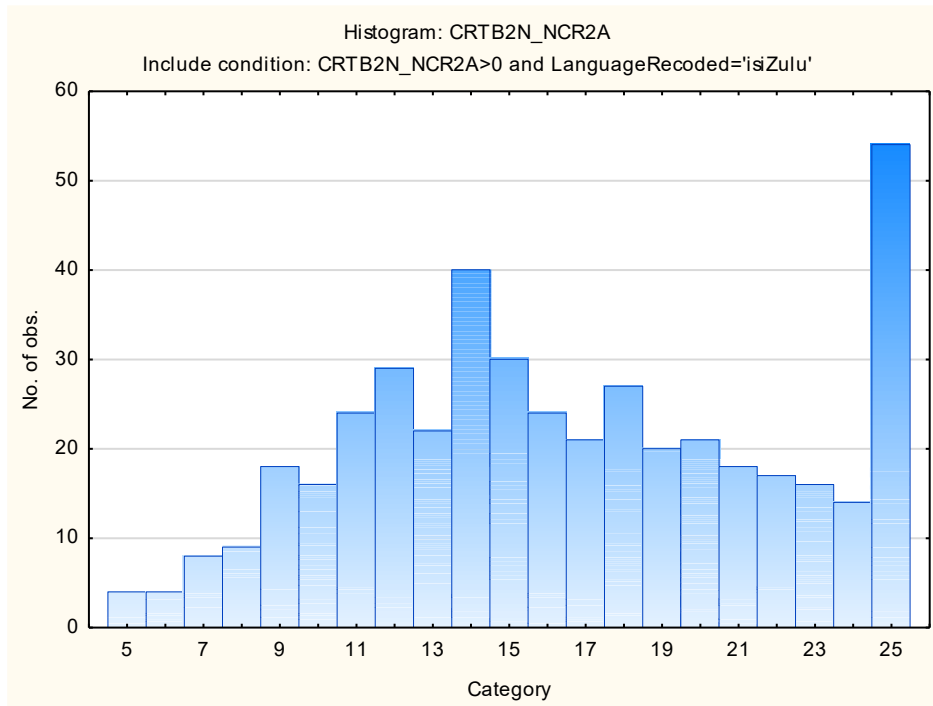


Descriptive statistics and frequency distributions on Critical Reasoning Test Battery subtests

Critical Numerical Reasoning Test

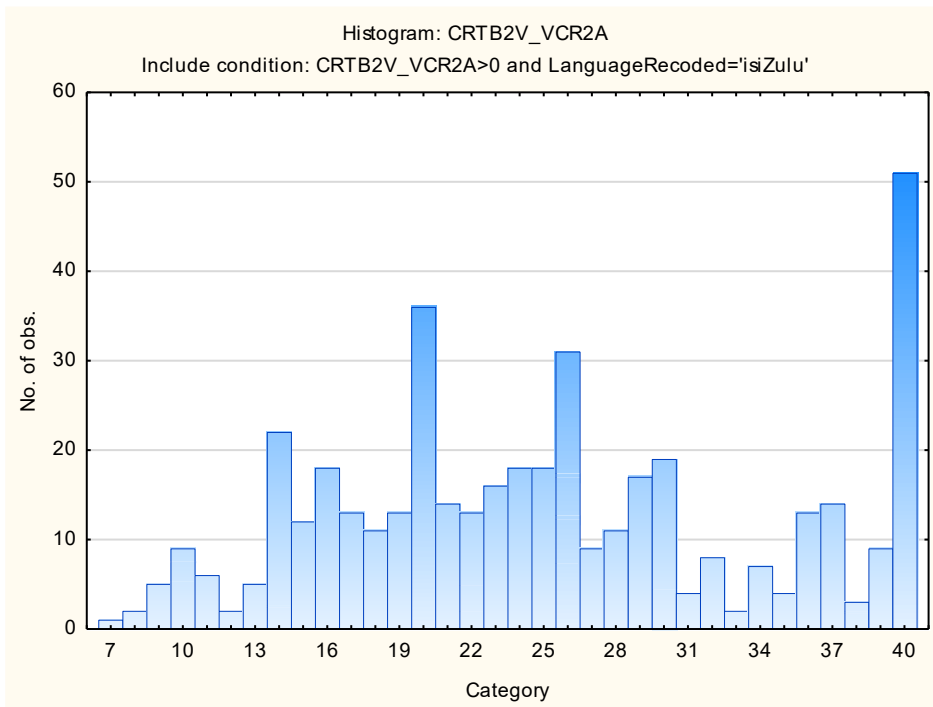
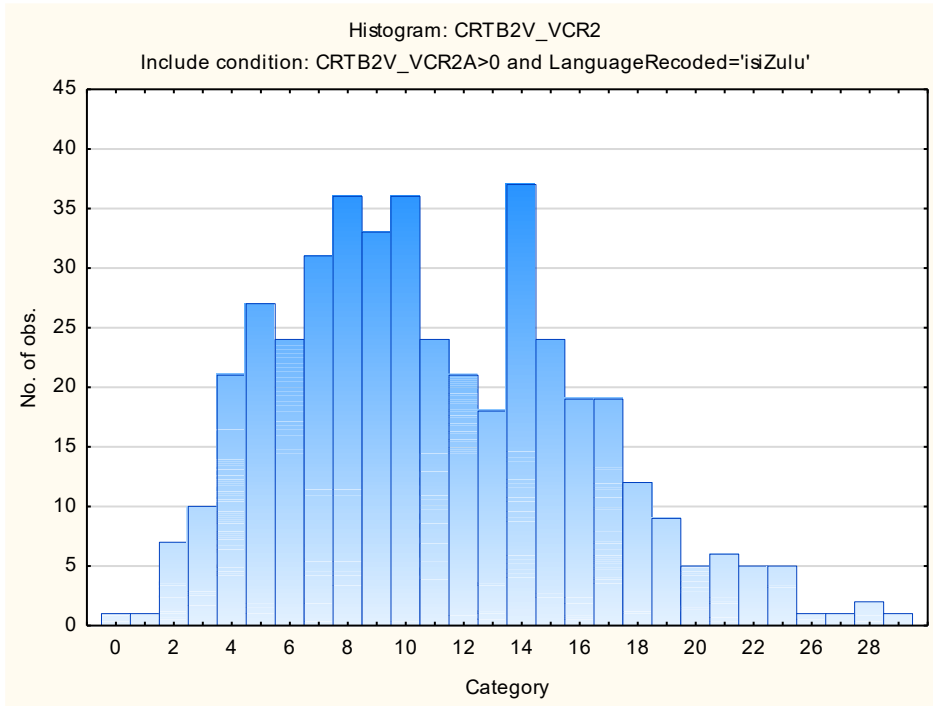
Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Critical Numerical Reasoning Test	6,37156	3,350693	0,000000	18,00000	436	0
Critical Numerical Reasoning Items Attempted	16,59404	5,387330	5,000000	25,00000	436	0





Critical Verbal Reasoning Test

Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Critical Verbal Reasoning Test	11,02064	5,257248	0,000000	33,00000	436	0
Critical Verbal Reasoning Items Attempted	25,32110	8,938750	7,000000	40,00000	436	0



Stanine table

Subtests	Stanine Groups								
	S9_1	S9_2	S9_3	S9_4	S9_5	S9_6	S9_7	S9_8	S9_9
Critical Verbal Reasoning	0-1	2-4	5-7	8-9	10-12	13-14	15-17	18-20	21-33
Critical Verbal Items Attempted	7-9	10-14	15-18	19-23	24-27	28-32	33-36	37-40	
Critical Numerical Reasoning	0-0	1-2	3-3	4-5	6-7	8-8	9-10	11-12	13-18
Critical Numerical Items Attempted	5-7	8-9	10-12	13-15	16-17	18-20	21-23	24-25	

Critical Reasoning Test (CRTB2)

Norm: South Africans, Setswana Language Group, Updated 2016

Sample Composition

The sample consisted of South Africans tested by Psytech South Africa and collaborators during the period up to June 2015. Since not all respondents completed all the subtests of the Critical Reasoning Test Battery, biographical characteristics are reported separately for the different subtests.

Critical Numerical Reasoning Test: Biographical Composition

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	96	96	53,93258	53,9326
M	82	178	46,06742	100,0000
Missing	0	178	0,00000	100,0000

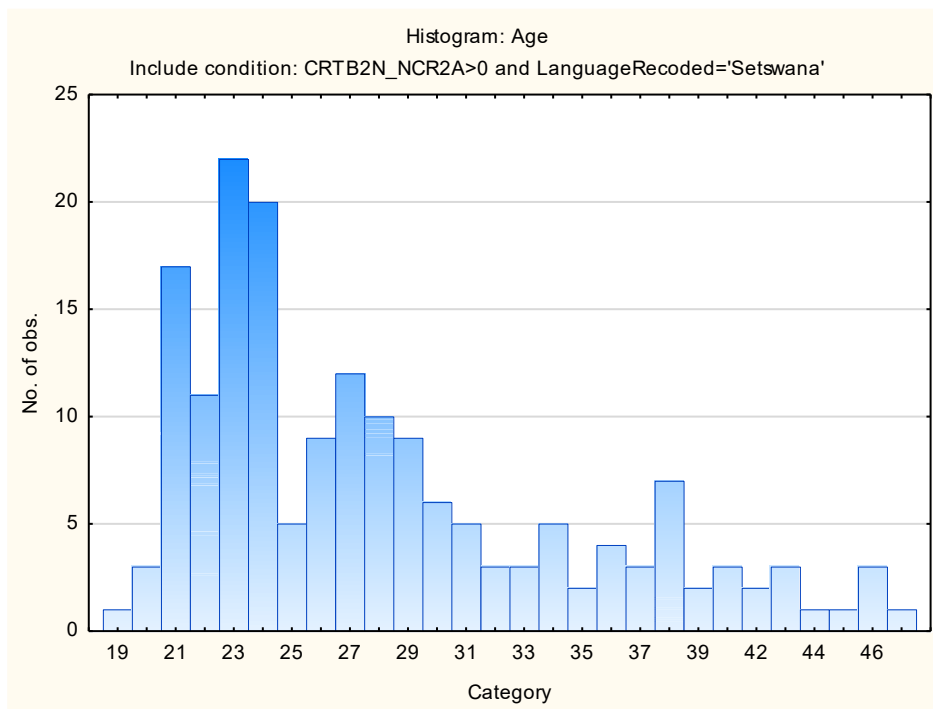
Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	115	115	64,60674	64,6067
Post Graduate	23	138	12,92135	77,5281
Grade 12	30	168	16,85393	94,3820
< Matric	1	169	0,56180	94,9438
Missing	9	178	5,05618	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Setswana	178	178	100,0000	100,0000
Missing	0	178	0,0000	100,0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	178	178	100,0000	100,0000
Missing	0	178	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	178	178	100,0000	100,0000
Missing	0	178	0,0000	100,0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	28,13873	6,788615	19,00000	51,00000	173	5



Critical Verbal Reasoning Test: Biographical Composition

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	90	90	51,13636	51,1364
M	86	176	48,86364	100,0000
Missing	0	176	0,00000	100,0000

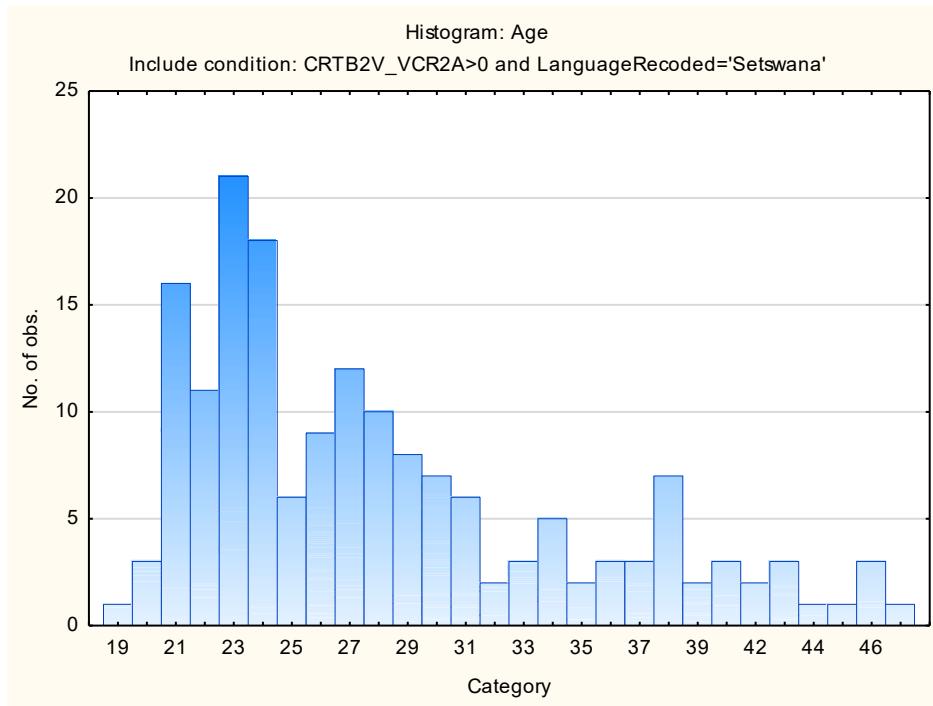
Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	114	114	64,77273	64,7727
Post Graduate	26	140	14,77273	79,5455
Grade 12	27	167	15,34091	94,8864
< Matric	1	168	0,56818	95,4545
Missing	8	176	4,54545	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Setswana	176	176	100,0000	100,0000
Missing	0	176	0,0000	100,0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	176	176	100,0000	100,0000
Missing	0	176	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	176	176	100,0000	100,0000
Missing	0	176	0,0000	100,0000

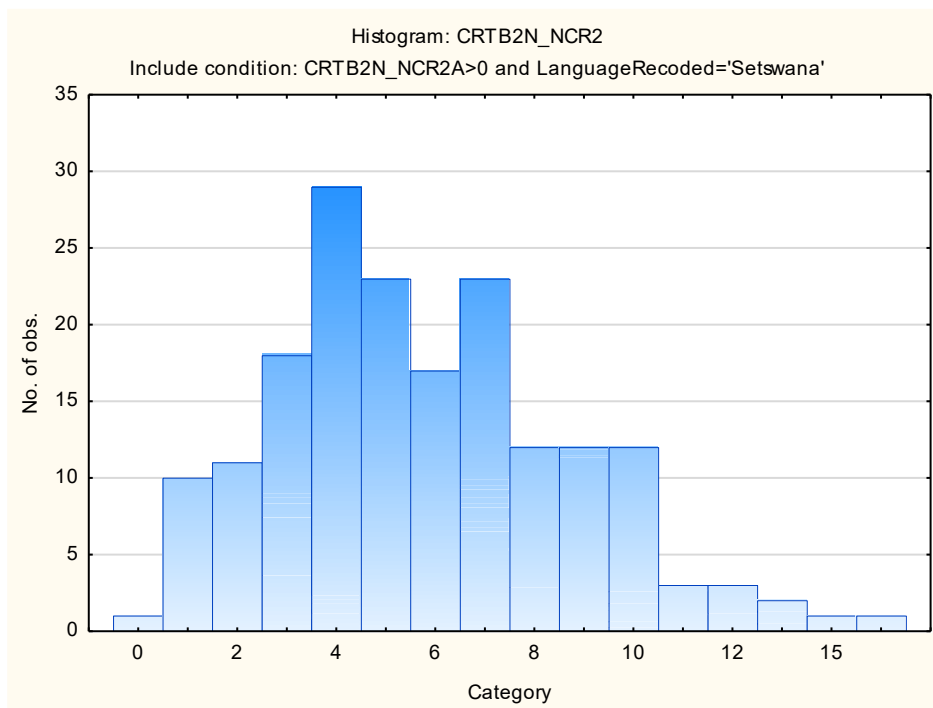
Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	28,19527	6,795725	19,00000	51,00000	169	7

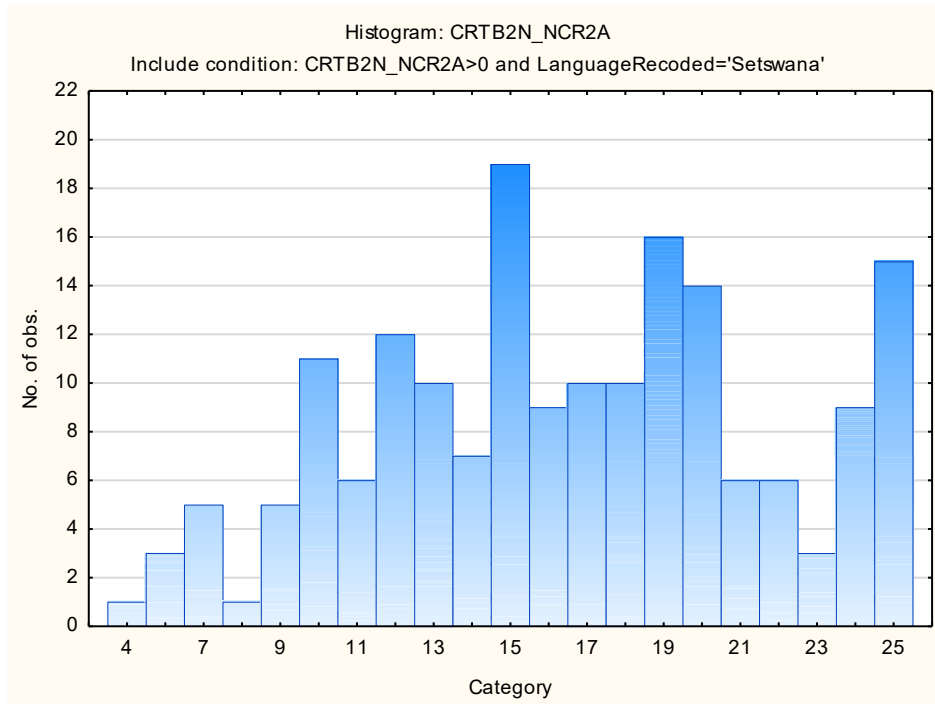


Descriptive statistics and frequency distributions on Critical Reasoning Test Battery subtests

Critical Numerical Reasoning Test

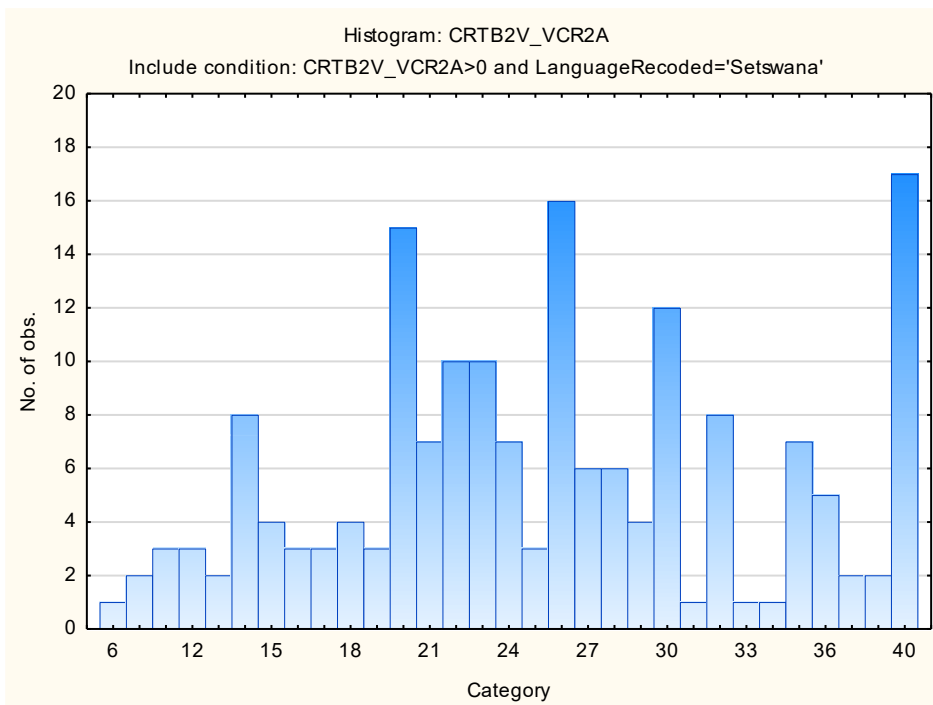
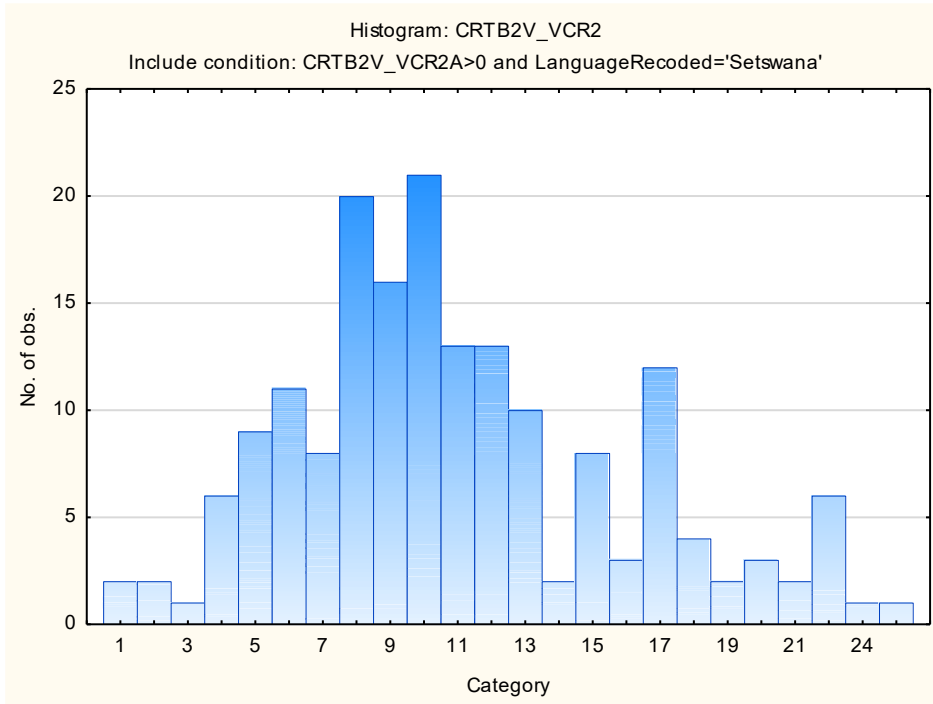
Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Critical Numerical Reasoning Test	5,78652	2,995182	0,000000	16,00000	178	0
Critical Numerical Reasoning Items Attempted	16,49438	5,193702	4,000000	25,00000	178	0





Critical Verbal Reasoning Test

Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Critical Verbal Reasoning Test	11,00000	4,943105	1,000000	25,00000	176	0
Critical Verbal Reasoning Items Attempted	25,54545	8,198828	6,000000	40,00000	176	0



Stanine table

Subtests	Stanine Groups								
	S9_1	S9_2	S9_3	S9_4	S9_5	S9_6	S9_7	S9_8	S9_9
Critical Verbal Reasoning	1-2	3-4	5-7	8-9	10-12	13-14	15-17	18-19	20-25
Critical Verbal Items Attempted	6-11	12-15	16-19	20-23	24-27	28-31	32-35	36-39	40-40
Critical Numerical Reasoning	0-0	1-2	3-3	4-5	6-6	7-8	9-9	10-11	12-16
Critical Numerical Items Attempted	4-7	8-10	11-12	13-15	16-17	18-20	21-22	23-25	

Critical Reasoning Test (CRTB2)

Norm: South Africans, Sesotho Language Group, Updated 2016

Sample Composition

The sample consisted of South Africans tested by Psytech South Africa and collaborators during the period up to June 2015. Since not all respondents completed all the subtests of the Critical Reasoning Test Battery, biographical characteristics are reported separately for the different subtests.

Critical Numerical Reasoning Test: Biographical Composition

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	113	113	46,12245	46,1224
M	132	245	53,87755	100,0000
Missing	0	245	0,00000	100,0000

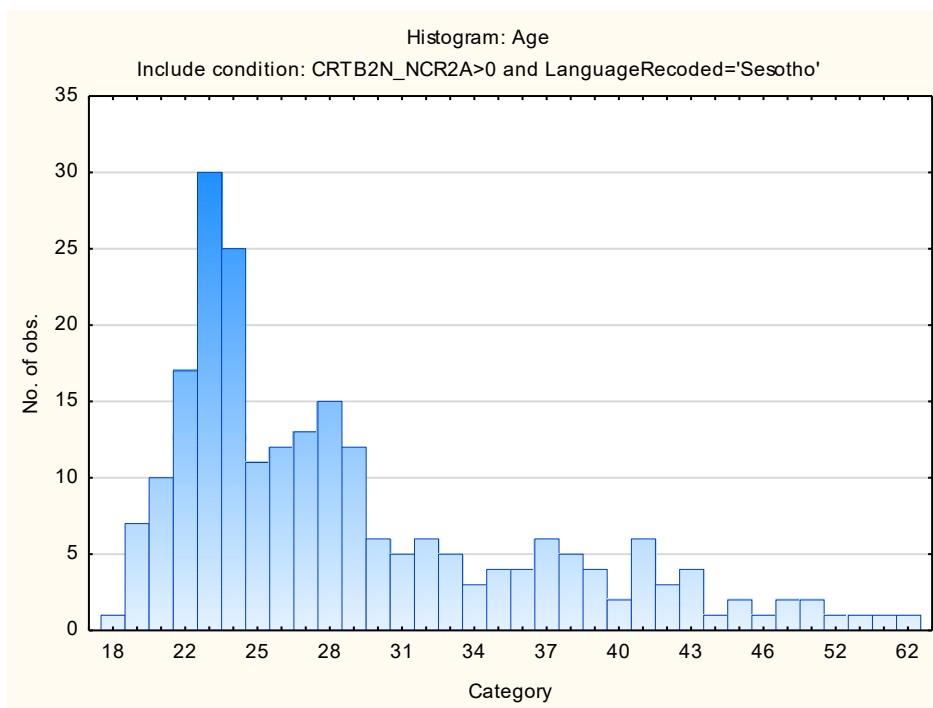
Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	157	157	64,08163	64,0816
Post Graduate	45	202	18,36735	82,4490
Grade 12	30	232	12,24490	94,6939
< Matric	1	233	0,40816	95,1020
Missing	12	245	4,89796	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Sesotho	245	245	100,0000	100,0000
Missing	0	245	0,0000	100,0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	245	245	100,0000	100,0000
Missing	0	245	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	245	245	100,0000	100,0000
Missing	0	245	0,0000	100,0000

Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	28,95614	7,781589	18,00000	62,00000	228	17



Critical Verbal Reasoning Test: Biographical Composition

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	113	113	45,93496	45,9350
M	133	246	54,06504	100,0000
Missing	0	246	0,00000	100,0000

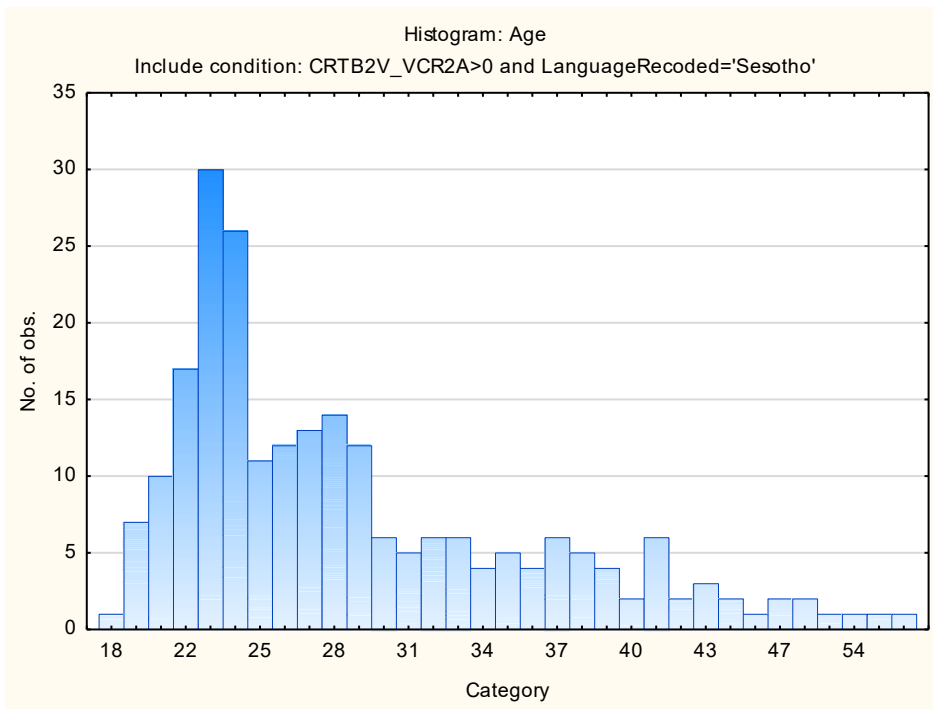
Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	158	158	64,22764	64,2276
Post Graduate	47	205	19,10569	83,3333
Grade 12	28	233	11,38211	94,7154
< Matric	1	234	0,40650	95,1220
Missing	12	246	4,87805	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Sesotho	246	246	100,0000	100,0000
Missing	0	246	0,0000	100,0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	246	246	100,0000	100,0000
Missing	0	246	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	246	246	100,0000	100,0000
Missing	0	246	0,0000	100,0000

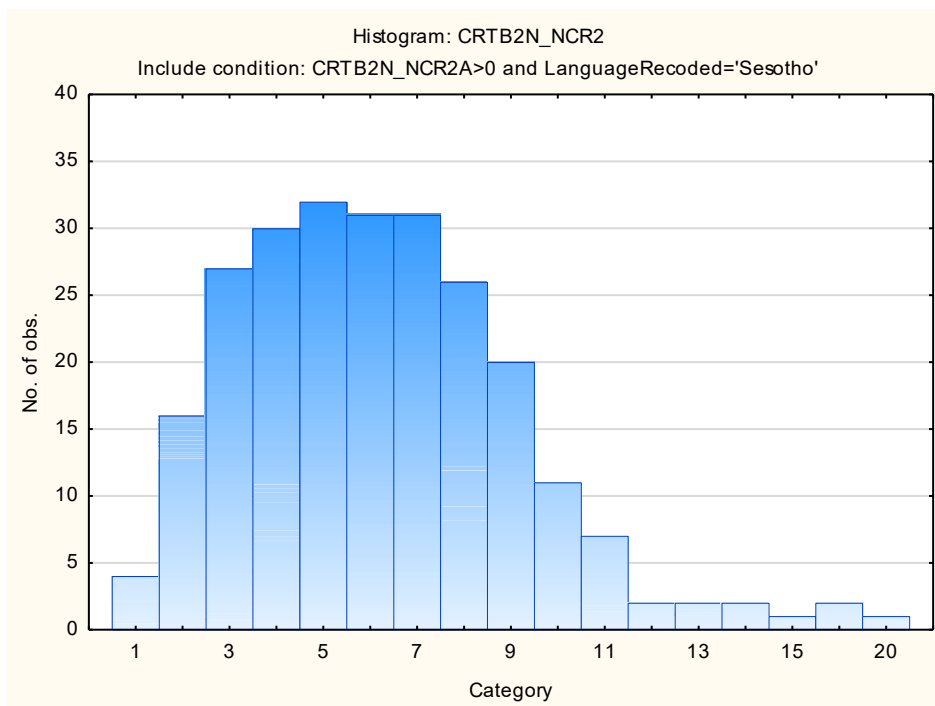
Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	28,82018	7,639922	18,00000	62,00000	228	18

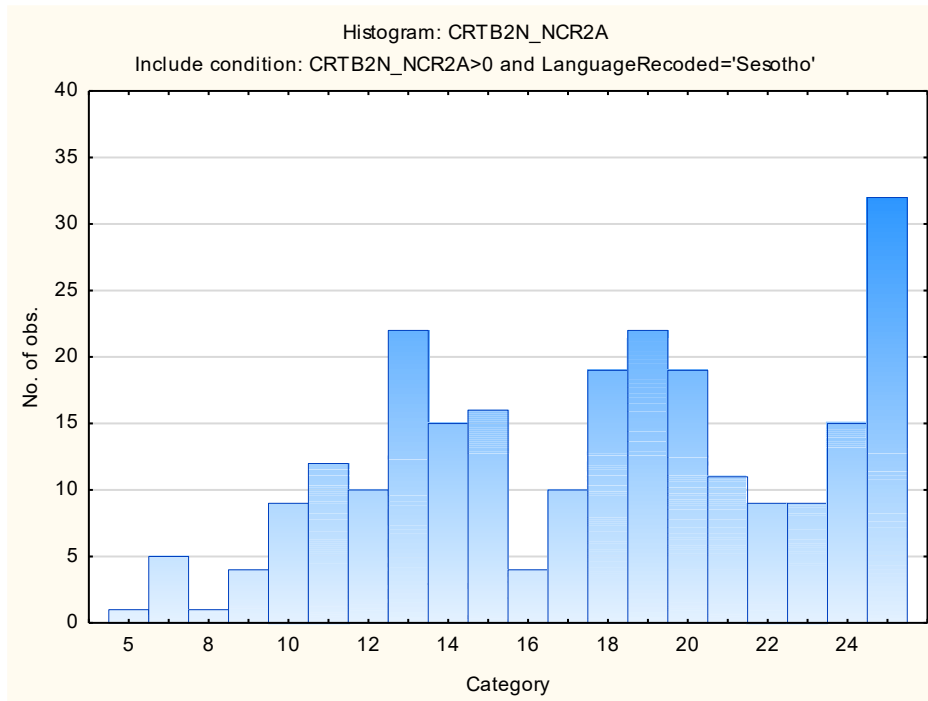


Descriptive statistics and frequency distributions on Critical Reasoning Test Battery subtests

Critical Numerical Reasoning Test

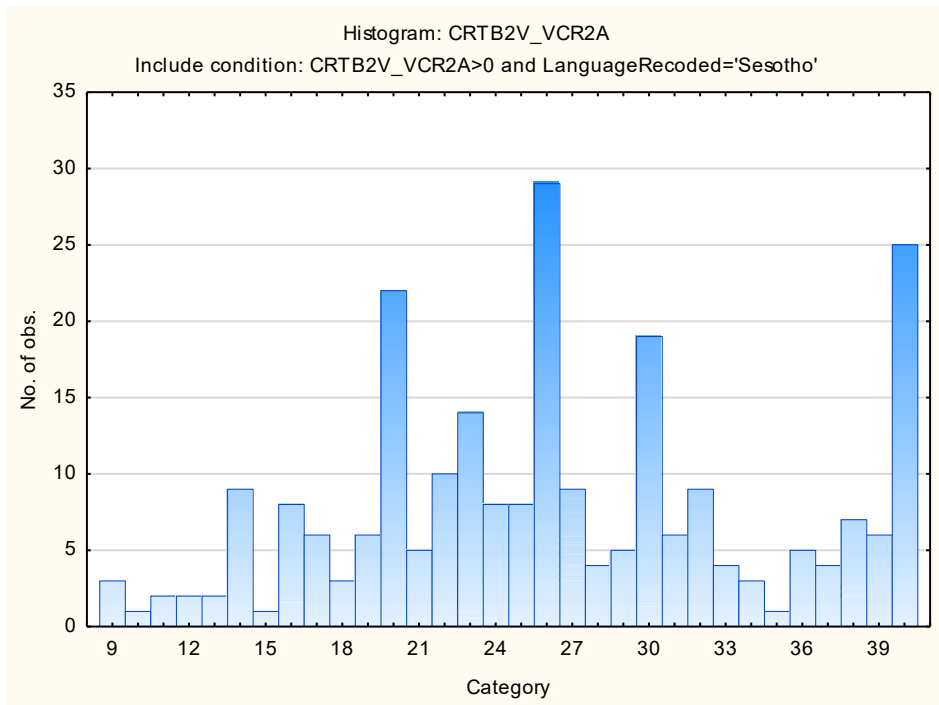
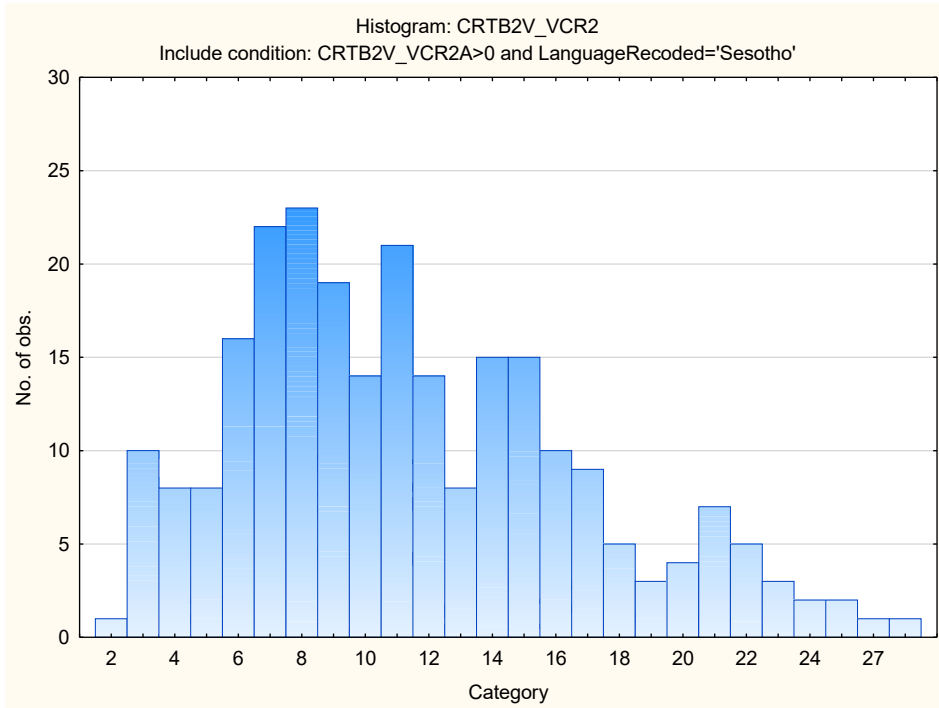
Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Critical Numerical Reasoning Test	6,20408	2,990282	1,000000	20,00000	245	0
Critical Numerical Reasoning Items Attempted	17,68163	5,093860	5,000000	25,00000	245	0





Critical Verbal Reasoning Test

Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Critical Verbal Reasoning Test	11,41463	5,433722	2,000000	28,00000	246	0
Critical Verbal Reasoning Items Attempted	26,51220	8,054271	9,000000	40,00000	246	0



Stanine table

Subtests	Stanine Groups								
	S9_1	S9_2	S9_3	S9_4	S9_5	S9_6	S9_7	S9_8	S9_9
Critical Verbal Reasoning	2-1	2-4	5-7	8-10	11-12	13-15	16-18	19-20	21-28
Critical Verbal Items Attempted	9-12	13-16	17-20	21-24	25-28	29-32	33-36	37-40	
Critical Numerical Reasoning	1-0	1-2	3-3	4-5	6-6	7-8	9-9	10-11	12-20
Critical Numerical Items Attempted	5-8	9-11	12-13	14-16	17-18	19-21	22-24	25-25	

Critical Reasoning Test (CRTB2)

Norm: South Africans, Indigenous Language Group, Updated 2016

Sample Composition

The sample consisted of South Africans tested by Psytech South Africa and collaborators during the period up to June 2015. Since not all respondents completed all the subtests of the Critical Reasoning Test Battery, biographical characteristics are reported separately for the different subtests.

Critical Numerical Reasoning Test: Biographical Composition

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	573	573	41,10473	41,1047
M	819	1392	58,75179	99,8565
U	2	1394	0,14347	100,0000
Missing	0	1394	0,00000	100,0000

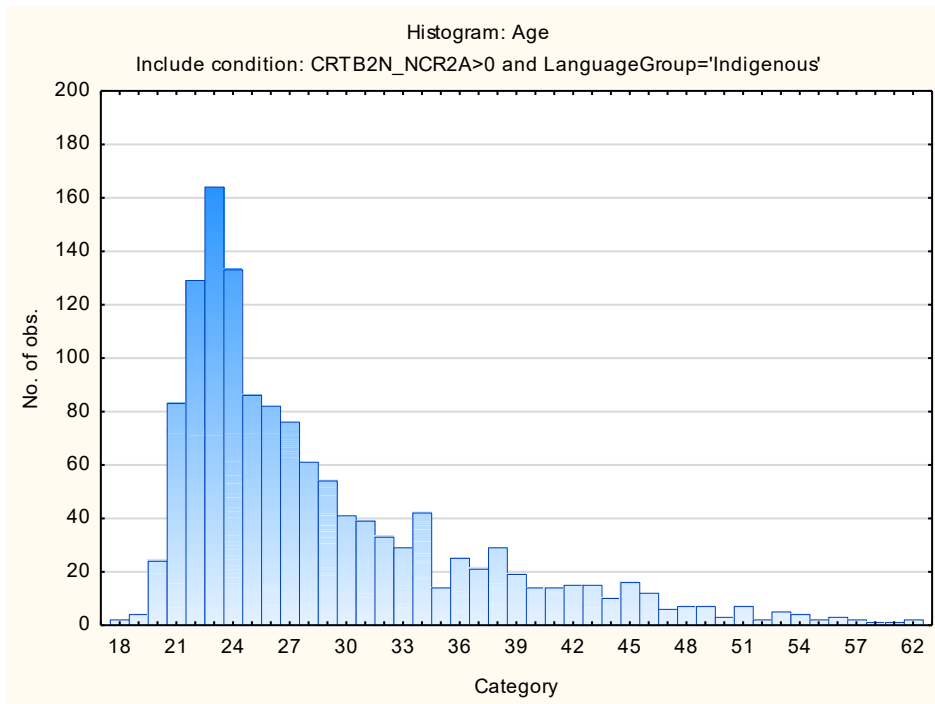
Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	906	906	64,99283	64,9928
Post Graduate	250	1156	17,93400	82,9268
Grade 12	158	1314	11,33429	94,2611
< Matric	10	1324	0,71736	94,9785
Missing	70	1394	5,02152	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Xitsonga	58	58	4,16069	4,1607
Setswana	178	236	12,76901	16,9297
Sesotho	245	481	17,57532	34,5050
Sepedi	97	578	6,95839	41,4634
isiXhosa	278	856	19,94261	61,4060
isiZulu	436	1292	31,27690	92,6829
Tshivenda	63	1355	4,51937	97,2023
isiNdebele	17	1372	1,21951	98,4218
siSwati	22	1394	1,57819	100,0000
Missing	0	1394	0,00000	100,0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	1394	1394	100,0000	100,0000
Missing	0	1394	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	1377	1377	98,78049	98,7805
Asian	7	1384	0,50215	99,2826
European	7	1391	0,50215	99,7848
Coloured	1	1392	0,07174	99,8565
Missing	2	1394	0,14347	100,0000

Variable	Descriptive Statistics Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	28,73094	7,812554	18,00000	62,00000	1338	56



Critical Verbal Reasoning Test: Biographical Composition

Category	Frequency table: Sex			
	Count	Cumulative Count	Percent	Cumulative Percent
F	570	570	40,68522	40,6852
M	830	1400	59,24340	99,9286
U	1	1401	0,07138	100,0000
Missing	0	1401	0,00000	100,0000

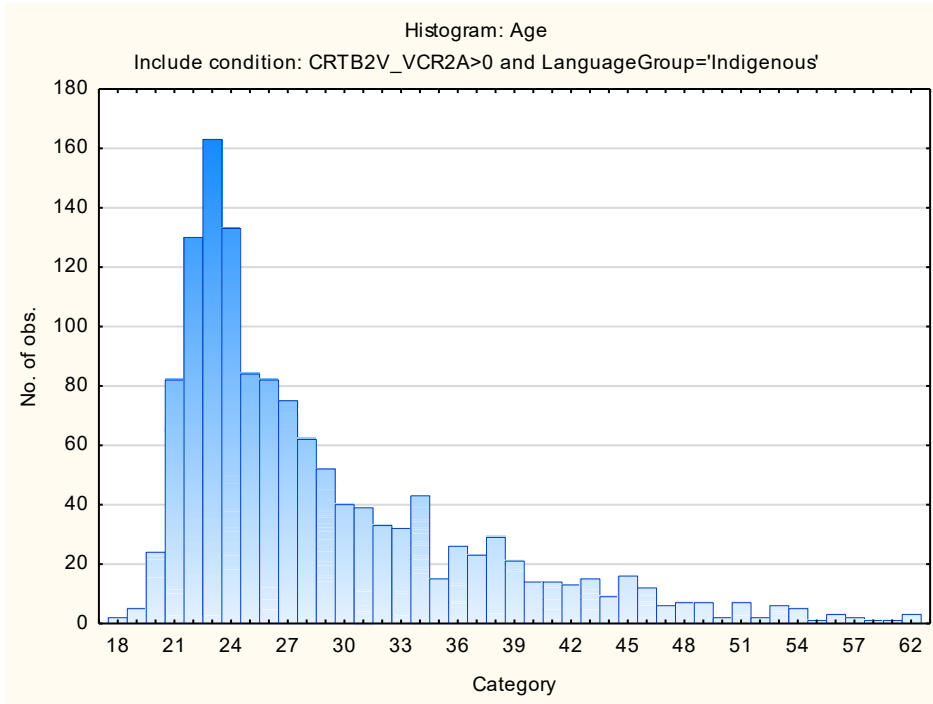
Category	Frequency table: Education			
	Count	Cumulative Count	Percent	Cumulative Percent
Tertiary	910	910	64,95360	64,9536
Post Graduate	261	1171	18,62955	83,5832
Grade 12	153	1324	10,92077	94,5039
< Matric	10	1334	0,71378	95,2177
Missing	67	1401	4,78230	100,0000

Category	Frequency table: Language			
	Count	Cumulative Count	Percent	Cumulative Percent
Xitsonga	59	59	4,21128	4,2113
Setswana	176	235	12,56246	16,7737
Sesotho	246	481	17,55889	34,3326
Sepedi	101	582	7,20914	41,5418
isiXhosa	280	862	19,98572	61,5275
isiZulu	436	1298	31,12063	92,6481
Tshivenda	64	1362	4,56817	97,2163
isiNdebele	17	1379	1,21342	98,4297
siSwati	22	1401	1,57031	100,0000
Missing	0	1401	0,00000	100,0000

Category	Frequency table: Language Group			
	Count	Cumulative Count	Percent	Cumulative Percent
Indigenous	1401	1401	100,0000	100,0000
Missing	0	1401	0,0000	100,0000

Category	Frequency table: Race			
	Count	Cumulative Count	Percent	Cumulative Percent
African	1382	1382	98,64383	98,6438
Asian	8	1390	0,57102	99,2148
European	7	1397	0,49964	99,7145
Coloured	2	1399	0,14276	99,8572
Missing	2	1401	0,14276	100,0000

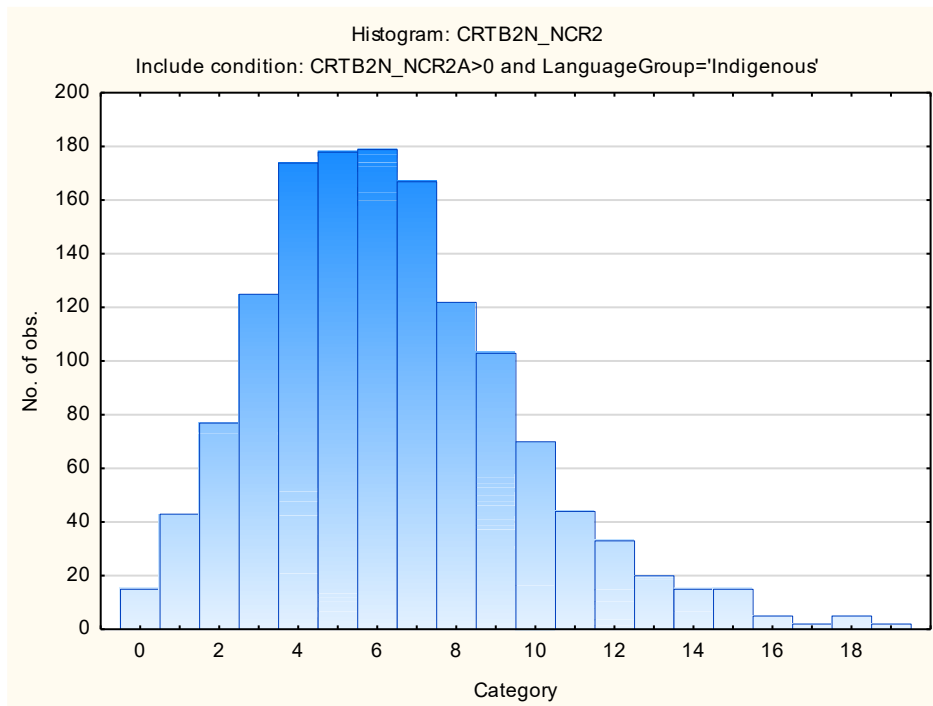
Variable	Descriptive Statistics: Age					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Age	28,78001	7,858169	18,00000	62,00000	1341	60

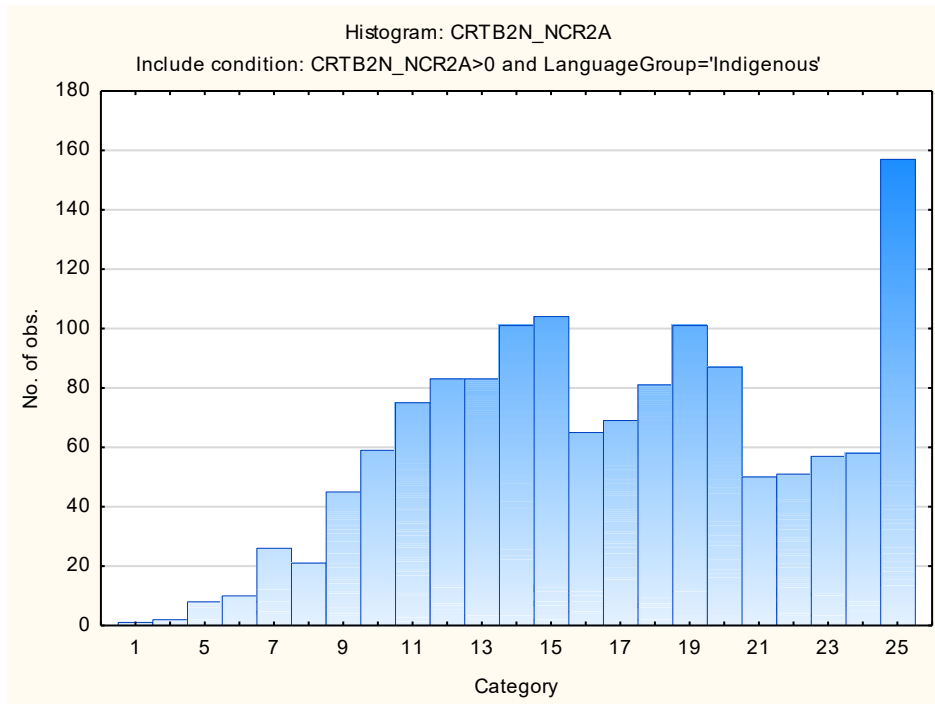


Descriptive statistics and frequency distributions on Critical Reasoning Test Battery subtests

Critical Numerical Reasoning Test

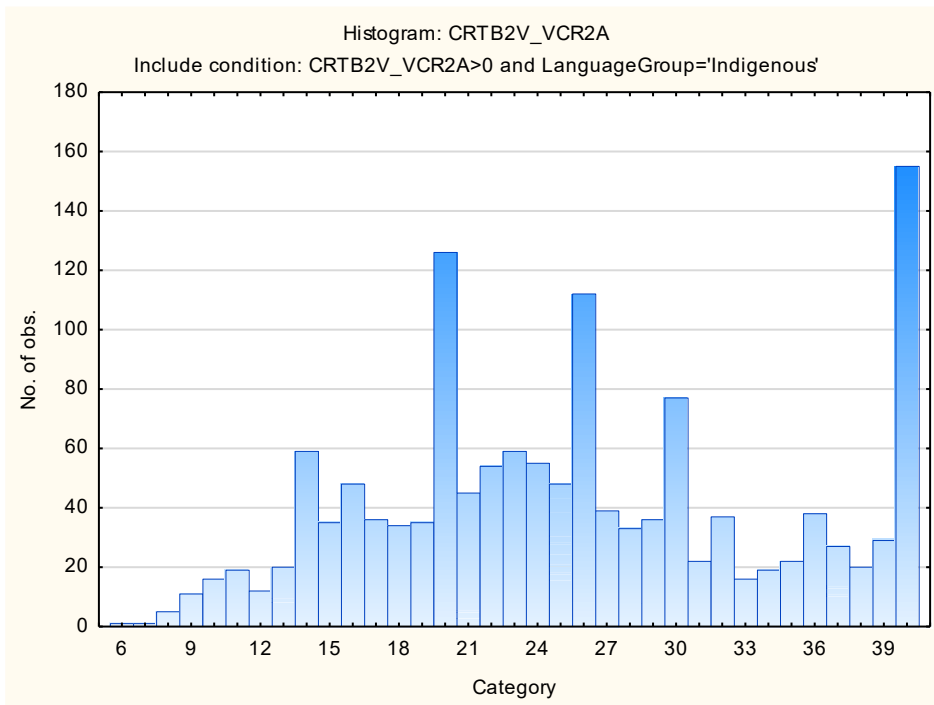
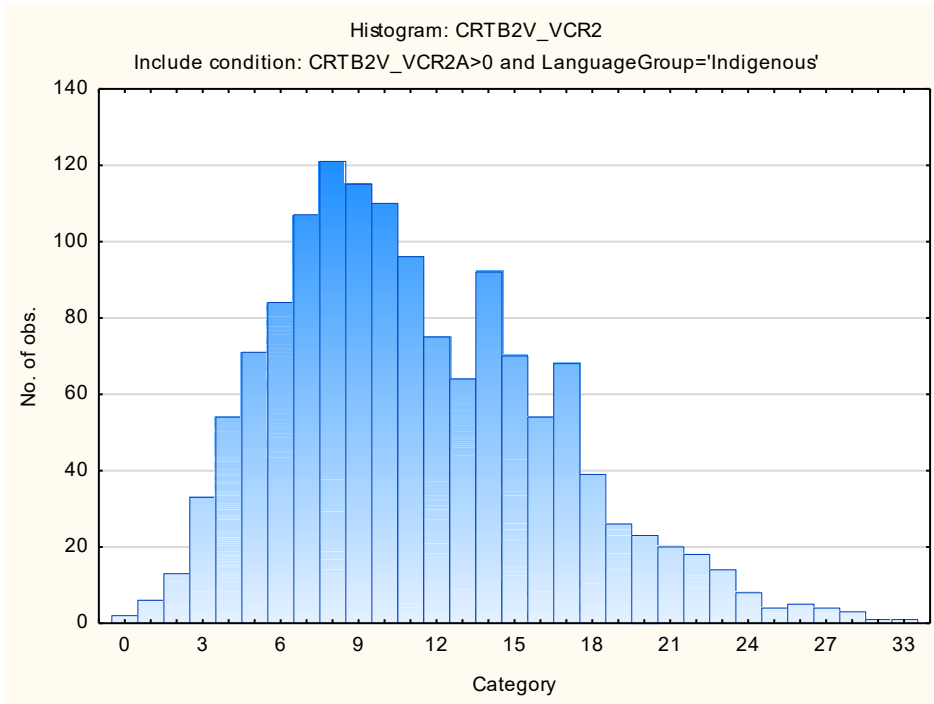
Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Critical Numerical Reasoning Test	6,32927	3,247824	0,000000	20,00000	1394	0
Critical Numerical Reasoning Items Attempted	16,82783	5,275244	1,000000	25,00000	1394	0





Critical Verbal Reasoning Test

Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
Critical Verbal Reasoning Test	11,18915	5,235516	0,000000	33,00000	1401	0
Critical Verbal Reasoning Items Attempted	25,67737	8,610549	6,000000	40,00000	1401	0



Stanine table

Subtests	Stanine Groups								
	S9_1	S9_2	S9_3	S9_4	S9_5	S9_6	S9_7	S9_8	S9_9
Critical Verbal Reasoning	0-2	3-4	5-7	8-9	10-12	13-15	16-17	18-20	21-33
Critical Verbal Items Attempted	6-10	11-14	15-19	20-23	24-27	28-32	33-36	37-40	
Critical Numerical Reasoning	0-0	1-2	3-3	4-5	6-7	8-8	9-10	11-12	13-20
Critical Numerical Items Attempted	1-7	8-10	11-12	13-15	16-18	19-20	21-23	24-25	

Critical Reasoning Test Battery Validity Introduction

Recommendations

Users are strongly encouraged to do validation studies on the instruments they use within their organisations or within their industry sectors, by co-operating with other organisations in the same industry. In some cases this may mean sharing information with organisations that are potential competitors. In the interest of professionalism, users are encouraged to overcome their reservations in this regard, since co-operation is in their interest. Psytech South Africa provides extensive support for validation studies done on its instruments, and users are welcome to contact their representatives in this regard.

For construct validation studies, it is necessary to assess a particular ability with more than one instrument on the same respondents. This may seem like an unnecessary expense at first, but it is worthwhile to verify how ability measures relate to one another, particularly if one is still introducing a new measure.

Predictive validation studies can be done against competency ratings, or against 'hard' data like production or sales figures. It is preferable to use both types of criterion information, because that enables one to validate the competency ratings as well.

At the time of writing, there was still a shortage of validity information, particularly predictive validity, regarding the Critical Reasoning Test Battery in South Africa. More information is being sought, and this section will shortly be updated.

Index of validity studies done on the Critical Reasoning Test Battery in South Africa

Description	Study Number
Prediction of Business School performance	V1
Correlations with GRT2 and LPCAT	V2
Prediction of Insurance Sales Performance	V3

CRTB2 Predictive Validity: Prediction of Business School performance

Prediction of MBA results:

The sample consisted of students doing the Masters of Business Administration degree at a postgraduate business school in Gauteng. The students were selected on the basis of academic criteria, interviews and psychometric tests.

Instruments used:

Apil battery (Aprolab) – the general potential score was used. Where appropriate, adjustments for disadvantage were implemented.

Critical Reasoning Test Battery version 2 (Psytech SA). This battery consists of verbal and numerical critical reasoning subtests.

The Occupational Personality Profile was also included in the selection battery and those results are reported under the validity of the OPP.

Basic statistics on ability test scores

Variable	Valid N	Mean	Minimum	Maximum	Std.Dev.
Verbal critical reasoning	102	26.07843	11	37	5.47666
Numerical Critical Reasoning	54	13.07407	1	22	4.26859
APIL General Learning Potential	102	62.93490	37	83	10.74932

Basic statistics on Academic scores

Variable	Valid N	Mean	Minimum	Maximum	Std.Dev.
Economics	101	66.81188	50	85	8.09903
Innovation and Design	100	63.06000	46	80	6.56717
Marketing	100	66.47000	47	78	6.22549
Organisational Behaviour	53	70.07547	52	83	6.99959
Financial Accounting	53	69.32075	62	80	4.11738
Human Resources systems	53	68.39623	52	84	6.95131
Management Accounting	53	63.00000	49	79	6.46291
Operations Management	52	69.86538	59	81	5.31748
Macroeconomics	53	74.45283	65	82	3.72913
Information Technology	53	66.81132	50	85	10.01740
Analytical Tools and Techniques	99	69.80808	50	93	9.62848
Entrepreneurship	53	68.79245	55	80	5.33623
Corporate Finance	53	71.00000	47	88	8.96146
Leadership	52	68.13462	57	81	4.69054
Organisational Development and Transformation	52	64.78846	48	84	7.74175
Competitive Strategy	53	71.15094	64	78	3.20694
MBA Average to date	102	67.81684	59	81	4.50275

Correlations between academic scores and ability tests

Only correlations that are significant at the 5% level or better are reported.

Variable	Verbal Critical Reasoning	Numerical crit. reasoning	Apil
Economics	.30		.38
Innovation and design	.34		.30
Marketing	.22		.40
Organisational Behaviour	.31		.45
Financial Accounting	.29		.46
HR Systems	.16		
Management Accounting	.33		.30
Operations Management			
Business, Government and the economy	.36		.59
Information Technology	.35		.40
Analytical Tools and techniques	.33		.42
Entrepreneurship			.31
Corporate Finance	.43		.50
Leadership		-.30	
Organisational Development and Transformation		-.30	
Competitive Strategy			.34
MBA Average to date	.43		.43

Comments:

The Apil and Verbal Critical reasoning both correlated significantly with most of the subject scores and with the average academic score. The Numerical Critical Reasoning test only correlated significantly with two subjects, and in both cases negatively. It must be borne in mind that the MBA students were pre-selected by academic achievement and work experience, which would serve to reduce the variance for ability tests.

Prediction of PDBA results

The sample consisted of students following the Postgraduate Diploma in Business Administration course at a postgraduate business school in Gauteng. Students were selected on the basis of academic achievement, interviews and psychometric tests. The entrance criteria for this course were more lenient than the criteria for the MBA course at the same institution, the results of which are reported above.

Basic statistics for academic variables

Variable	Valid N	Mean	Minimum	Maximum	Std.Dev.
Business decision making	58	59.36207	43	79	8.00153
Economics	51	63.17647	38	83	9.67617
Innovation and design	57	59.36842	43	76	7.93643
Marketing	52	63.53846	46	76	7.14407
Organisational Behaviour	52	69.25000	56	85	7.26224
Financial Accounting	52	63.30769	26	80	9.82302
HR Systems	28	66.78571	53	77	6.36167
Management Accounting	50	65.10000	22	94	13.13859
Operations Management	31	67.38710	56	79	6.40144
Business, Government and the economy	35	66.91429	54	82	7.08508
Information technology	39	64.28205	38	81	10.14617
Project Management and Research Skills	35	76.57143	59	96	9.783797
PDBA Average	58	64.26872	45.2	78	6.693927

Basic statistics on Psychometric variables

Variable	Valid N	Mean	Minimum	Maximum	Std. Dev.
Verbal Critical Reasoning	56	20.07143	8	32	6.34710
Numerical Critical Reasoning	36	10.50000	2	21	4.61983
Apil general learning potential score	57	56.01860	33.94	82.81	12.79638

Correlations between Psychometric Scores and Academic Scores

Only correlations significant at the 5% level or better are shown

Variable	Verbal Critical Reasoning	Numerical Critical Reasoning	APIL General Learning
Business decision making	.61*	.53*	.50*
Economics			.34*
Innovation and design	.35*		.38*
Marketing	.41*		
Organisational Behaviour	.34*	.40*	
Financial Accounting	.39*	.48*	.44*
HR Systems			
Management Accounting	.49*	.37*	.55*
Operations Management			.55*
Business, Government and the economy		.44*	.45*
Information technology	.51*	.45*	.50*
Project Management and Research Skills	.37*	.43*	
PDBA Average Mark	.52*	.54*	.57*

Comments:

For the Postgraduate Diploma in Business Management where the selection on academic and work experience grounds was not so strict, both the Verbal and Numerical Critical Reasoning tests were predictors for course achievement for several of the subjects.

CRTB2 Construct Validity: Correlations with GRT2 and LPCAT

The sample consisted of 25 candidates for articulated clerkships at a South African bank.

Correlations that were not significant at the 5% level were discarded.

The variables were:

VR2	General Verbal Reasoning
NR2	General Numerical Reasoning
AR2	General Abstract Reasoning
VCR2	Verbal Critical Reasoning
NCR2	Numerical Critical Reasoning
LPPRE	LPCAT Pretest
LPPOST	LPCAT Posttest
LPDIFF	LPCAT Difference
LPCOMP	LPCAT Composite

Correlations found (Only correlations significant at the 5% level are reported)

Variable	VR2	NR2	AR2	VCR2	NCR2	LPPRE	LPPOST	LPDIFF	LPCOMP
VR2		.63*	.55*	.67*	.54*	.45*	.44*		.49*
NR2	.63*		.78*	.76*	.72*	.48*	.57*		.52*
AR2	.55*	.78*		.52*	.69*	.66*	.74*		.69*
VCR2	.67*	.76*	.52*		.62*		.44*		.42*
NCR2	.54*	.72*	.69*	.62*		.44*	.60*	.51*	.49*
LPPRE	.45*	.48*	.66*		.44*	1.00	.91*		1.00*
LPPOST	.44*	.57*	.74*	.44*	.60*	.91*		.48*	.93*
LPDIFF					.51*		.48*		
LPCOMP	.49*	.52*	.69*	.42*	.49*	1.00*	.93*	.	

Comments:

The Abstract reasoning test correlated highly with the tests of numerical ability and learning potential. This supports the contention that the Abstract Reasoning test gives an indication of a respondent's ability to learn. As expected, the verbal reasoning subtests correlated highly, as did the numerical subtests. Correlations between the abstract reasoning test and the verbal reasoning tests were fairly high. The verbal critical reasoning subtest had the lowest correlation with Abstract reasoning and learning potential, indicating that this ability is perhaps most influenced by a person's educational experiences, and should not be used as an indication of potential.

CRTB2 Concurrent Validity: Insurance Sales

Sample composition

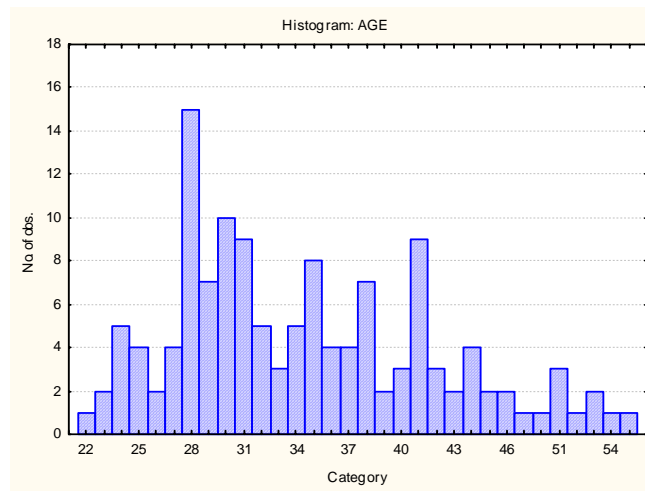
The sample consisted of insurance sales agents at a major South African insurance company, who had more than a year's service.

Frequency table: SEX				
Category	Count	Cumulative Count	Percent	Cumulative Percent
Male	115	115	79.86111	79.8611
Female	22	137	15.27778	95.1389
Missing	7	144	4.86111	100.0000

Frequency table: First Language				
Category	Count	Cumulative Count	Percent	Cumulative Percent
English	88	88	61.11111	61.1111
Afrikaans	24	112	16.66667	77.7778
Sesotho	6	118	4.16667	81.9444
isiZulu	7	125	4.86111	86.8056
Setswana	4	129	2.77778	89.5833
Sepedi	1	130	0.69444	90.2778
Missing	14	144	9.72222	100.0000

Frequency table: EDUCATION				
Category	Count	Cumulative Count	Percent	Cumulative Percent
Technikon/University diploma	36	36	25.00000	25.0000
Grade 12	63	99	43.75000	68.7500
Grade 10 or 11	2	101	1.38889	70.1389
Vocational Training	8	109	5.55556	75.6944
Post Graduate	10	119	6.94444	82.6389
Degree	10	129	6.94444	89.5833
University Entrance Matric	1	130	0.69444	90.2778
Missing	14	144	9.72222	100.0000

Frequency table: RACE				
Category	Count	Cumulative Count	Percent	Cumulative Percent
European	101	101	70.13889	70.1389
Asian	7	108	4.86111	75.0000
Coloured	3	111	2.08333	77.0833
African	19	130	13.19444	90.2778
Missing	14	144	9.72222	100.0000



Correlations with production statistics

Variable	Correlations	
	VCR2	NCR2
PRODUCTION OVER 12 MONTHS	0.23	0.27
PRODUCTION PER MONTH	0.22	0.27
NUMBER OF POLICIES SOLD	0.08	0.08
NUMBER OF POLICIES SOLD PER MONTH	0.07	0.08
PERSISTENCY OF POLICIES SOLD	0.07	0.13

Correlations
Marked correlations are significant at $p < .05000$
N=98 (Casewise deletion of missing data)

Comments

Low but significant correlations were found for both Verbal and Numerical Critical Reasoning with total production over 12 months and monthly production figures. The ability test scores did not have a significant correlation with the number of policies sold, or whether clients continued to pay their premiums (persistency). The recommendation was that the Critical Reasoning Test Battery should not be used in isolation to predict performance, but that it should be combined with a personality test in a formula based on the results of a stepwise multiple regression analysis.

Critical Reasoning Test Battery (CRTB2)

Differential Item Functioning

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<i>Introduction</i> _____	1
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What is Differential Item Functioning?

Differential item functioning is found when a test item behaves differently for different population groups. Normally this means that the item shows a different relationship to the construct in question for different population groups. Normally one groups the respondents in terms of their level of score achieved on the construct, and then compares the likelihood of getting an item correct for the different population groups and the different score levels.

There are two different forms of Differential Item Functioning that are of interest to us:

Uniform bias means that one population group consistently has a better chance of answering an item correctly, irrespective of their total score.

Non-uniform bias means that the relative chance of answering the item correctly is not the same across all score levels, for different groups. This can be seen clearly on a graph, when the lines plotting the mean item score for a group are not parallel and may cross in places.

Ways of calculating Differential Item Functioning

There are many different ways of investigating Differential Item Functioning.

For the purpose of this manual, **Factorial Analysis of Variance** was used. This technique allows us to investigate the effect of combinations of continuous and categorical variables on predictor variables. It produces a particularly informative graph which is useful for visualising the effect of non-uniform bias.

The Factorial Analysis of Variance can also indicate uniform bias when a significant effect for the race group variable is found. Non-uniform bias is indicated by a significant interaction effect for the race group variable and score level.

Dividing the samples into score levels

The samples were divided into score levels in such a way that there would be sufficient persons of each group in every score category. To do this, stanine scores were calculated and the frequency tables for every race group examined for the stanine scores. To avoid creating cells with very few cases, resulting in meaningless output, the groups could not always be divided up evenly. It should also be pointed out that the low end and high end of the distributions could not be examined in great detail, because there are few persons in any group that score at the extremes of the scale. Only if one has an extremely large sample can the high end and low end of a scale be fully studied for bias. The score level variable used in the study can only be considered ordinal data (the intervals are not of uniform size). This should be borne in mind when interpreting the graphs.

Grouping respondents

Ideally, one would want to examine all race groups in detail, but in practice this is not always possible. The grouping of respondents according to race group had to be determined by the availability of data. Grouping is usually done with all Black candidates on one group, and all the other groups in the other.

Direction and magnitude of differences

If DIF is found, the bias is not necessarily in favour of the Non-Black or Advantaged group. The size of the differences in item means scores must also be considered. In some cases the differences are very small. For every study, a summary of the findings is given, as well as a detailed report of the findings for every item. The differences between race groups, where bias is found, is graphically depicted.

Differential item functioning study reported for the Critical Reasoning Test Battery:

As yet there is only one Differential Item Functioning study available, since this is the only sample for which there were sufficient numbers of different race groups to make such a study possible.

Tests	Grouping	Sample	Study number
Verbal Critical Reasoning Numerical Critical Reasoning	Black - NonBlack	SA Business School Applicants	D1

CRTB2 Differential Item functioning: Applicants to graduate business school. Grouping variable: Race group.

Sample composition

Applicants to a business school in Gauteng, applying for admission to either the Masters of Business Administration degree or the Postgraduate Diploma in Business Administration. Data were collected during the period 2000-2002.

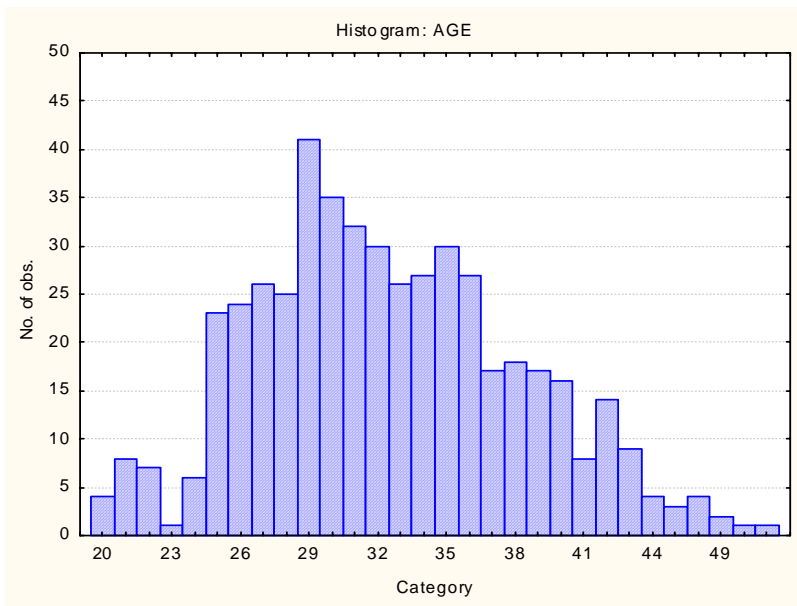
Sample composition

Category	Frequency table: RACE			
	Count	Cumulative Count	Percent	Cumulative Percent
Black	174	174	35.22267	35.2227
White	236	410	47.77328	82.9960
Asian	34	444	6.88259	89.8785
Coloured	12	456	2.42915	92.3077
Missing	38	494	7.69231	100.0000

Category	Frequency table: GENDER			
	Count	Cumulative Count	Percent	Cumulative Percent
Female	149	149	30.16194	30.1619
Male	338	487	68.42105	98.5830
Undisclosed	1	488	0.20243	98.7854
Missing	6	494	1.21457	100.0000

Category	Frequency table: LANGUAGE			
	Count	Cumulative Count	Percent	Cumulative Percent
eng	213	213	43.11741	43.1174
afr	74	287	14.97976	58.0972
shona	6	293	1.21457	59.3117
sesotho	5	298	1.01215	60.3239
zulu	35	333	7.08502	67.4089
danish	2	335	0.40486	67.8138
xhosa	22	357	4.45344	72.2672
tsonga	6	363	1.21457	73.4818
nsotho	20	383	4.04858	77.5304
ssotho	16	399	3.23887	80.7692
kikuyu	1	400	0.20243	80.9717
italian/: italian/eng	1	401	0.20243	81.1741
sotho	7	408	1.41700	82.5911
tswana	26	434	5.26316	87.8543
venda	2	436	0.40486	88.2591
sepedi	1	437	0.20243	88.4615
kiswahil: kiswahili	1	438	0.20243	88.6640
siswati	4	442	0.80972	89.4737
telagu	1	443	0.20243	89.6761
Error	1	444	0.20243	89.8785
portuguese	1	445	0.20243	90.0810
swati	1	446	0.20243	90.2834
swazi	2	448	0.40486	90.6883
ndebele	1	449	0.20243	90.8907
russian	2	451	0.40486	91.2955
yoruba	1	452	0.20243	91.4980
tshivenda	1	453	0.20243	91.7004
bemba	1	454	0.20243	91.9028
german	1	455	0.20243	92.1053
Missing	39	494	7.89474	100.0000

Variable	Descriptive Statistics					
	Mean	Std.Dev	Minimum	Maximum	N	No.cases Missing
AGE	32.55144	6.470267	20.00000	99.00000	486	8



Method

Applicants were classified into Black and non-Black for the purpose of the analysis, since the size of the sample did not allow for finer distinctions.

Applicants were classified into score levels for the test being evaluated. The cut-offs for the levels were determined by examining the frequency distributions for both race groups, trying to ensure a sufficient number of cases for both races in each category.

The statistical technique used in this study was factorial analysis of variance. For every item a factorial analysis of variance was done, using the scored item response as dependent variable, and the race group and score level (on the overall test score for the subtest being investigated) as predictor variables. If a significant effect was found for race, that was taken as an indication of uniform item bias, and the least-square difference in the means for that item was plotted graphically to illustrate which race group had a higher probability of getting the item right. If a significant interaction effect was found for race group and score level, that was taken as an indication of non-uniform item bias, and the means at all levels for both race groups were plotted to illustrate the severity of the non-uniform bias that was found.

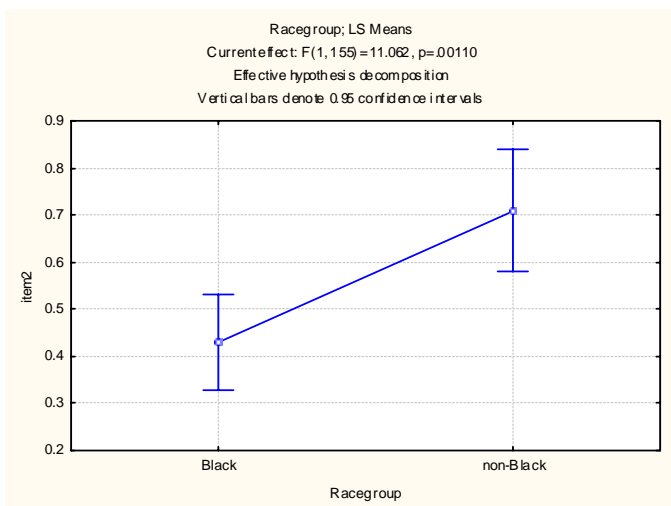
Detailed results by item for Verbal Critical Reasoning Test

Item number	Uniform bias	In favour of group	Non-Uniform bias
1	No		No
2	Yes	Non-Black	No
3	No		No
4	No		No
5	No		No
6	No		No
7	No		No
8	No		No
9	No		No
10	No		No
11	Yes	Non-Black	No
12	No		No
13	No		No
14	Yes	Non-Black	No
15	No		No
16	Yes	Black	Yes
17	No		No
18	No		No
19	No		No
20	No		No
21	No		No
22	No		No
23	No		No
24	No		No
25	No		No
26	No		No
27	No		No
28	No		No
29	No		No
30	No		No
31	No		Yes
32	No		No
33	No		No
34	No		No
35	No		Yes
36	No		No
37	No		No
38	No		No
39	No		No
40	No		Yes

Uniform bias was found in four items. Three items were found to be biased in favour of the Non-Black group, one item was found to be biased in favour of the Black group. Non-uniform bias was found in four items, one of which also exhibited uniform bias. This is graphically illustrated in the detailed results that follow.

Univariate Tests of Significance for item1 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept	25.48803	1	25.48803	121.7245	0.000000
Racegroup	0.03943	1	0.03943	0.1883	0.664926
Scorelevel	5.92436	5	1.18487	5.6587	0.000080
Racegroup*Scorelevel	0.42977	5	0.08595	0.4105	0.840973
Error	32.45562	155	0.20939		

Univariate Tests of Significance for item2 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup					
Scorelevel					
Racegroup*Scorelevel	1.58375	5	0.31675	1.5507	0.177310
Error	31.66011	155	0.20426		



Univariate Tests of Significance for item3 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.36803	1	0.36803	1.8455	0.176279
Scorelevel	1.35085	5	0.27017	1.3548	0.244430
Racegroup*Scorelevel	1.94532	5	0.38906	1.9510	0.089003
Error	30.90994	155	0.19942		

Univariate Tests of Significance for item4 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept	70.43305	1	70.43305	405.4553	0.000000
Racegroup	0.05771	1	0.05771	0.3322	0.565211
Scorelevel	0.35034	5	0.07007	0.4033	0.845949
Racegroup*Scorelevel	0.23779	5	0.04756	0.2738	0.926924
Error	26.92559	155	0.17371		

Univariate Tests of Significance for item5 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.37718	1	0.37718	2.0503	0.154190
Scorelevel	1.25710	5	0.25142	1.3667	0.239805
Racegroup*Scorelevel	0.53006	5	0.10601	0.5763	0.718115
Error	28.51438	155	0.18396		

Univariate Tests of Significance for item6 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.05446	1	0.054456	0.42157	0.517118
Scorelevel	0.29158	5	0.058315	0.45144	0.811755
Racegroup*Scorelevel	0.71191	5	0.142383	1.10224	0.361517
Error	20.02220	155	0.129175		

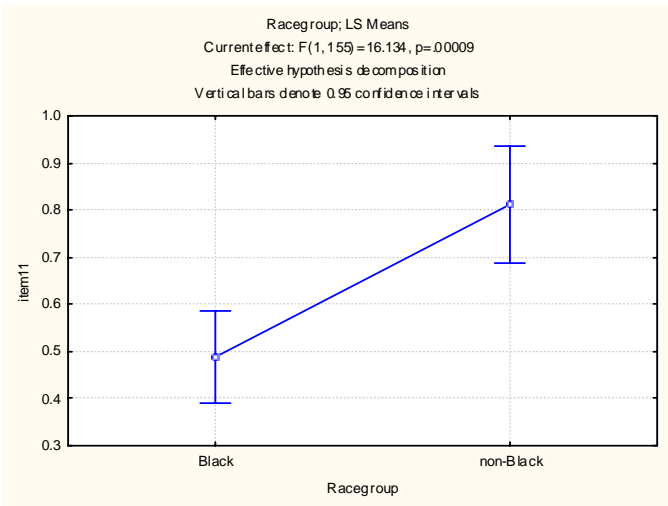
Univariate Tests of Significance for item7 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.20213	1	0.20213	1.0487	0.307412
Scorelevel					
Racegroup*Scorelevel	1.72510	5	0.34502	1.7900	0.117967
Error	29.87596	155	0.19275		

Univariate Tests of Significance for item8 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept	55.78805	1	55.78805	316.8045	0.000000
Racegroup	0.37763	1	0.37763	2.1445	0.145111
Scorelevel	4.44192	5	0.88838	5.0449	0.000260
Racegroup*Scorelevel	0.45935	5	0.09187	0.5217	0.759581
Error	27.29491	155	0.17610		

Univariate Tests of Significance for item9 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.16770	1	0.16770	0.80190	0.371915
Scorelevel	1.52550	5	0.30510	1.45887	0.206441
Racegroup*Scorelevel	1.84598	5	0.36920	1.76535	0.123108
Error	32.41584	155	0.20913		

Univariate Tests of Significance for item10 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.25169	1	0.25169	1.2161	0.271839
Scorelevel					
Racegroup*Scorelevel	1.23773	5	0.24755	1.1961	0.313665
Error	32.08023	155	0.20697		

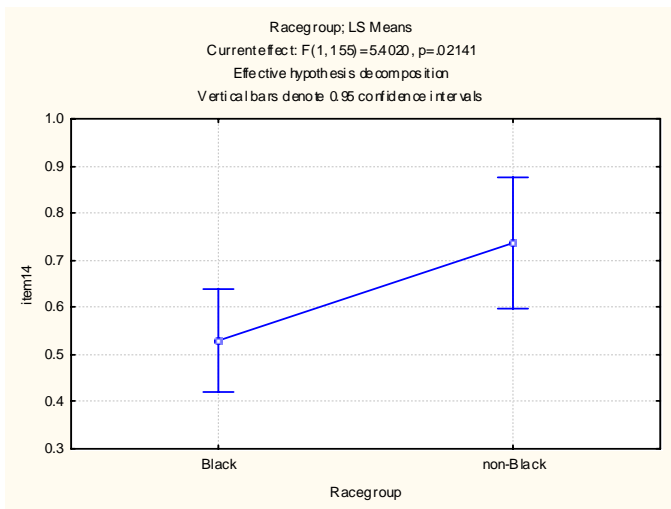
Univariate Tests of Significance for item11 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup					
Scorelevel					
Racegroup*Scorelevel	1.53031	5	0.30606	1.6286	0.155550
Error	29.12927	155	0.18793		



Univariate Tests of Significance for item12 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept	46.64420	1	46.64420	230.4339	0.000000
Racegroup	0.54078	1	0.54078	2.6716	0.104182
Scorelevel	1.67595	5	0.33519	1.6559	0.148503
Racegroup*Scorelevel	1.99276	5	0.39855	1.9689	0.086222
Error	31.37494	155	0.20242		

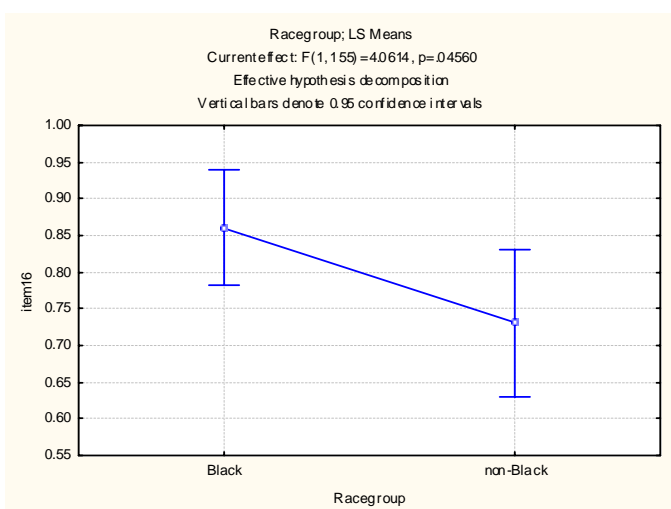
Univariate Tests of Significance for item13 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.35865	1	0.35865	1.5938	0.208678
Scorelevel					
Racegroup*Scorelevel	1.16905	5	0.23381	1.0390	0.396778
Error	34.87956	155	0.22503		

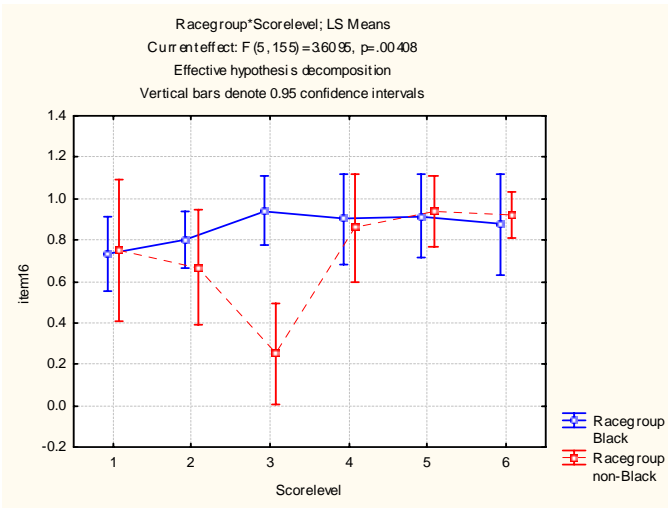
Univariate Tests of Significance for item14 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup					
Scorelevel	1.01295	5	0.20259	0.8912	0.488585
Racegroup*Scorelevel	1.65540	5	0.33108	1.4564	0.207280
Error	35.23572	155	0.22733		



Univariate Tests of Significance for item15 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept	27.97443	1	27.97443	137.8774	0.000000
Racegroup	0.02576	1	0.02576	0.1270	0.722098
Scorelevel	4.83970	5	0.96794	4.7707	0.000440
Racegroup*Scorelevel	0.62197	5	0.12439	0.6131	0.689995
Error	31.44849	155	0.20289		

Univariate Tests of Significance for item16 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup					
Scorelevel					
Racegroup*Scorelevel					
Error	18.71338	155	0.12073		





Univariate Tests of Significance for item17 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept	20.83802	1	20.83802	96.69092	0.000000
Racegroup	0.00013	1	0.00013	0.00060	0.980464
Scorelevel	3.55610	5	0.71122	3.30014	0.007346
Racegroup*Scorelevel	1.41820	5	0.28364	1.31613	0.259988
Error	33.40430	155	0.21551		

Univariate Tests of Significance for item18 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.09018	1	0.090180	0.45358	0.501643
Scorelevel	2.18516	5	0.437033	2.19816	0.057214
Racegroup*Scorelevel	1.56296	5	0.312592	1.57225	0.171038
Error	30.81676	155	0.198818		

Univariate Tests of Significance for item19 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.01569	1	0.01569	0.07090	0.790388
Scorelevel					
Racegroup*Scorelevel	1.53371	5	0.30674	1.38638	0.232307
Error	34.29433	155	0.22125		

Univariate Tests of Significance for item20 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept	49.52075	1	49.52075	276.3498	0.000000
Racegroup	0.00218	1	0.00218	0.0122	0.912249
Scorelevel	5.77106	5	1.15421	6.4411	0.000018
Racegroup*Scorelevel	1.04548	5	0.20910	1.1669	0.327989
Error	27.77536	155	0.17920		

Univariate Tests of Significance for item21 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.26446	1	0.26446	1.24293	0.266632
Scorelevel					
Racegroup*Scorelevel	1.16432	5	0.23286	1.09443	0.365741
Error	32.97954	155	0.21277		

Univariate Tests of Significance for item22 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.06511	1	0.06511	0.4188	0.518501
Scorelevel					
Racegroup*Scorelevel	0.25167	5	0.05033	0.3237	0.898108
Error	24.09852	155	0.15547		

Univariate Tests of Significance for item23 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.06812	1	0.06812	0.30554	0.581228
Scorelevel					
Racegroup*Scorelevel	0.63903	5	0.12781	0.57321	0.720449
Error	34.55984	155	0.22297		

Univariate Tests of Significance for item24 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept	78.97962	1	78.97962	749.2353	0.000000
Racegroup	0.14949	1	0.14949	1.4181	0.235530
Scorelevel	2.85212	5	0.57042	5.4113	0.000129
Racegroup*Scorelevel	0.82273	5	0.16455	1.5610	0.174303
Error	16.33911	155	0.10541		

Univariate Tests of Significance for item25 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.00557	1	0.00557	0.03004	0.862621
Scorelevel					
Racegroup*Scorelevel	1.19988	5	0.23998	1.29460	0.269008
Error	28.73204	155	0.18537		

Univariate Tests of Significance for item26 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.02076	1	0.02076	0.1608	0.688959
Scorelevel					
Racegroup*Scorelevel	0.60416	5	0.12083	0.9362	0.459306
Error	20.00621	155	0.12907		

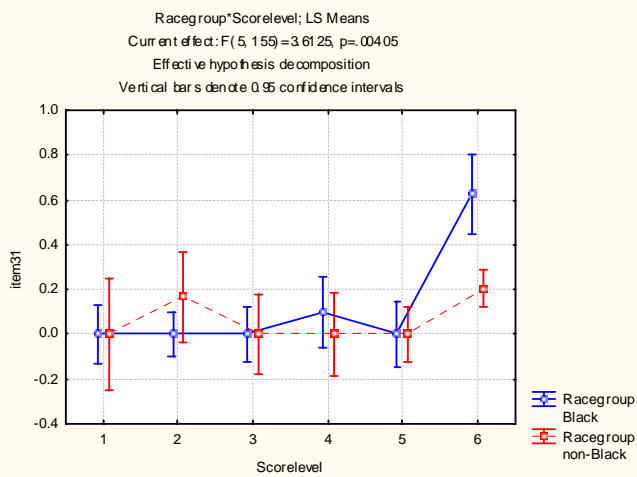
Univariate Tests of Significance for item27 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.41428	1	0.41428	2.6401	0.106229
Scorelevel					
Racegroup*Scorelevel	1.70005	5	0.34001	2.1668	0.060547
Error	24.32243	155	0.15692		

Univariate Tests of Significance for item28 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept	16.71125	1	16.71125	86.48979	0.000000
Racegroup	0.11759	1	0.11759	0.60861	0.436503
Scorelevel	3.71526	5	0.74305	3.84570	0.002594
Racegroup*Scorelevel	1.60954	5	0.32191	1.66605	0.145967
Error	29.94855	155	0.19322		

Univariate Tests of Significance for item29 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.05475	1	0.05475	0.4088	0.523505
Scorelevel					
Racegroup*Scorelevel	0.79015	5	0.15803	1.1800	0.321461
Error	20.75739	155	0.13392		

Univariate Tests of Significance for item30 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.25340	1	0.25340	1.8420	0.176692
Scorelevel					
Racegroup*Scorelevel	0.88048	5	0.17610	1.2801	0.275249
Error	21.32318	155	0.13757		

Univariate Tests of Significance for item31 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.100084	1	0.100084	1.55639	0.214076
Scorelevel					
Racegroup*Scorelevel					
Error	9.967308	155	0.064305		

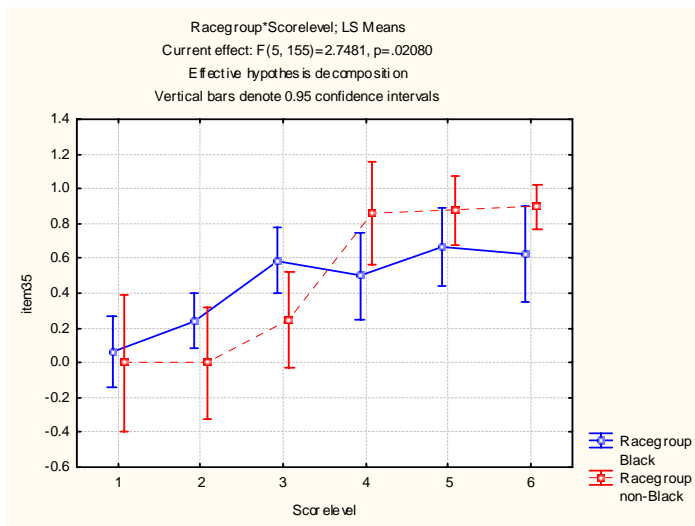


Univariate Tests of Significance for item32					
Sigma-restricted parameterization					
Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept	26.52977	1	26.52977	147.9153	0.000000
Racegroup	0.00104	1	0.00104	0.0058	0.939307
Scorelevel	7.47713	5	1.49543	8.3377	0.000001
Racegroup*Scorelevel	0.48852	5	0.09770	0.5447	0.742129
Error	27.80048	155	0.17936		

Univariate Tests of Significance for item33					
Sigma-restricted parameterization					
Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.06188	1	0.061877	0.47753	0.490575
Scorelevel					
Racegroup*Scorelevel	0.24122	5	0.048243	0.37232	0.867048
Error	20.08425	155	0.129576		

Univariate Tests of Significance for item34					
Sigma-restricted parameterization					
Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.02367	1	0.023672	0.15460	0.694713
Scorelevel					
Racegroup*Scorelevel	0.71810	5	0.143620	0.93800	0.458128
Error	23.73247	155	0.153113		

Univariate Tests of Significance for item35					
Sigma-restricted parameterization					
Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept	24.85542	1	24.85542	158.2203	0.000000
Racegroup	0.02989	1	0.02989	0.1902	0.663320
Scorelevel	9.99458	5	1.99892	12.7243	0.000000
Racegroup*Scorelevel	2.15857	5	0.43171	2.7481	0.020796
Error	24.34953	155	0.15709		



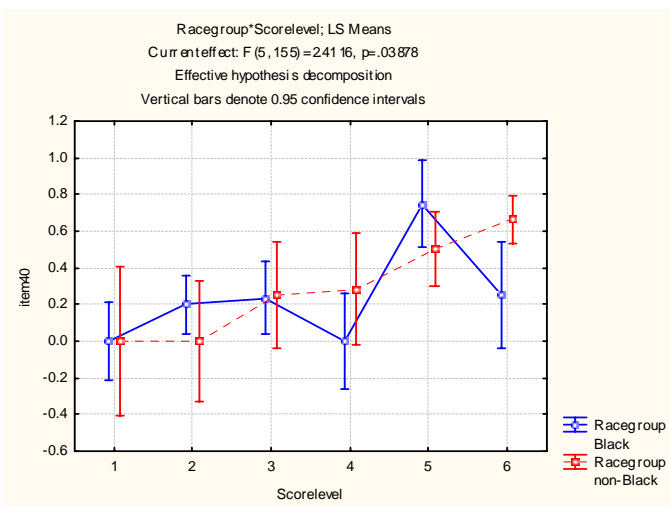
Univariate Tests of Significance for item36					
Sigma-restricted parameterization					
Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.00173	1	0.00173	0.00995	0.920677
Scorelevel					
Racegroup*Scorelevel	0.39552	5	0.07910	0.45441	0.809595
Error	26.98251	155	0.17408		

Univariate Tests of Significance for item37					
Sigma-restricted parameterization					
Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.00065	1	0.000649	0.00455	0.946313
Scorelevel					
Racegroup*Scorelevel	0.08983	5	0.017965	0.12599	0.986359
Error	22.10235	155	0.142596		

Univariate Tests of Significance for item38 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept	3.43997	1	3.439966	22.96459	0.000004
Racegroup	0.00014	1	0.000137	0.00092	0.975905
Scorelevel	4.26877	5	0.853754	5.69951	0.000074
Racegroup*Scorelevel	0.34394	5	0.068787	0.45921	0.806097
Error	23.21813	155	0.149794		

Univariate Tests of Significance for item39 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.00262	1	0.002620	0.01362	0.907238
Scorelevel					
Racegroup*Scorelevel	0.66124	5	0.132249	0.68767	0.633476
Error	29.80881	155	0.192315		

Univariate Tests of Significance for item40 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.05723	1	0.057229	0.33595	0.563016
Scorelevel					
Racegroup*Scorelevel					
Error	26.40406	155	0.170349		

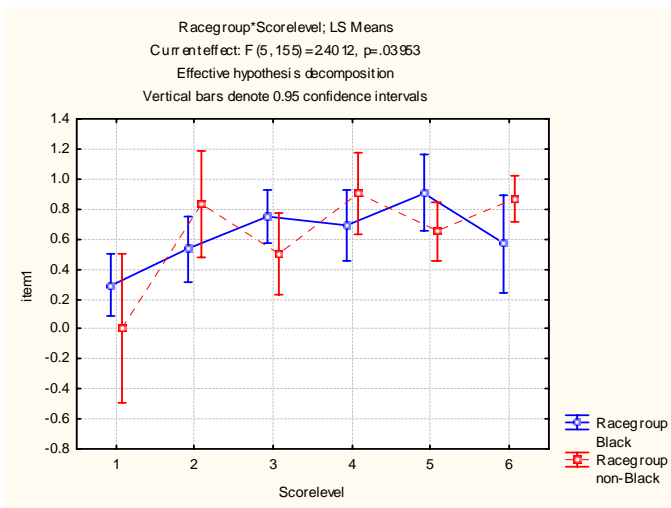


Detailed results by item for Numerical Critical Reasoning Test

Item number	Uniform bias	In favour of group	Non-Uniform bias
1	No		Yes
2	No		No
3	No		Yes
4	No		No
5	No		No
6	No		No
7	No		No
8	No		No
9	No		No
10	No		No
11	Yes	Black	No
12	No		No
13	No		No
14	No		No
15	No		No
16	No		No
17	No		No
18	No		No
19	No		Yes
20	No		No
21	No		No
22	No		No
23	No		No
24	No		No
25	No		No

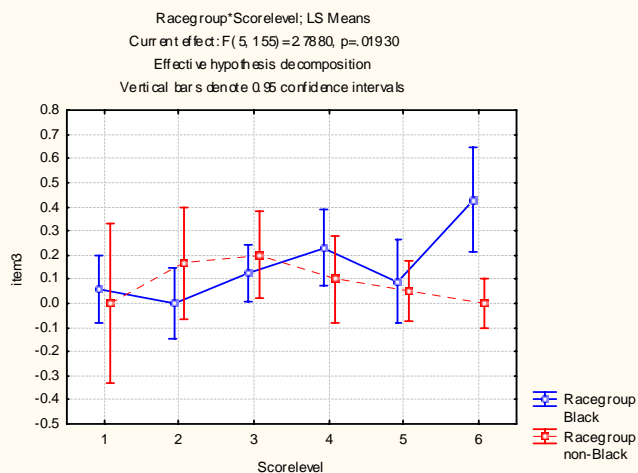
Uniform bias was found in one item, in favour of the Black group. Non-uniform bias was found in three items. The bias that was found is illustrated in the graphs included in the detailed results that follow.

Univariate Tests of Significance for item1 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept	44.69369	1	44.69369	235.4494	0.000000
Racegroup	0.00001	1	0.00001	0.0001	0.993448
Scorelevel	3.60552	5	0.72110	3.7988	0.002837
Racegroup*Scorelevel	2.27902	5	0.45580	2.4012	0.039530
Error	29.42256	155	0.18982		



Univariate Tests of Significance for item2 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.04757	1	0.04757	0.2041	0.652061
Scorelevel					
Racegroup*Scorelevel	0.93955	5	0.18791	0.8063	0.546812
Error	36.12438	155	0.23306		

Univariate Tests of Significance for item3 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.13826	1	0.138265	1.67685	0.197270
Scorelevel	0.46147	5	0.092293	1.11931	0.352413
Racegroup*Scorelevel					
Error	12.78058	155	0.082455		



Univariate Tests of Significance for item4 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept	10.09139	1	10.09139	48.52166	0.000000
Racegroup	0.59365	1	0.59365	2.85439	0.093135
Scorelevel	3.47890	5	0.69578	3.34547	0.006740
Racegroup*Scorelevel	0.89299	5	0.17860	0.85874	0.510394
Error	32.23644	155	0.20798		

Univariate Tests of Significance for item5 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.20920	1	0.20920	1.2684	0.261804
Scorelevel					
Racegroup*Scorelevel	0.86782	5	0.17356	1.0523	0.389153
Error	25.56461	155	0.16493		

Univariate Tests of Significance for item6 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.24055	1	0.24055	1.2153	0.271984
Scorelevel					
Racegroup*Scorelevel	1.29981	5	0.25996	1.3134	0.261115
Error	30.67915	155	0.19793		

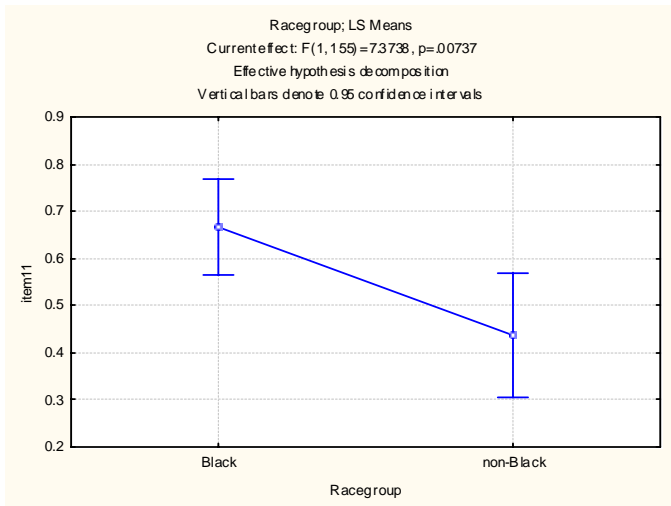
Univariate Tests of Significance for item7 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept	17.58681	1	17.58681	79.09120	0.000000
Racegroup	0.33469	1	0.33469	1.50517	0.221738
Scorelevel	2.35573	5	0.47115	2.11883	0.066003
Racegroup*Scorelevel	2.46972	5	0.49394	2.22136	0.054863
Error	34.46598	155	0.22236		

Univariate Tests of Significance for item8 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.17784	1	0.17784	1.0258	0.312718
Scorelevel					
Racegroup*Scorelevel	1.46016	5	0.29203	1.6845	0.141448
Error	26.87151	155	0.17336		

Univariate Tests of Significance for item9 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.00003	1	0.00003	0.0002	0.989886
Scorelevel					
Racegroup*Scorelevel	0.43876	5	0.08775	0.4263	0.829797
Error	31.90275	155	0.20582		

Univariate Tests of Significance for item10 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.04176	1	0.04176	0.2534	0.615383
Scorelevel					
Racegroup*Scorelevel	0.26313	5	0.05263	0.3194	0.900752
Error	25.53870	155	0.16477		

Univariate Tests of Significance for item11 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept	34.77408	1	34.77408	171.3126	0.000000
Racegroup	1.49678	1	1.49678	7.3738	0.007369
Scorelevel	6.40072	5	1.28014	6.3066	0.000023
Racegroup*Scorelevel	0.46604	5	0.09321	0.4592	0.806116
Error	31.46286	155	0.20299		



Univariate Tests of Significance for item12 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.33892	1	0.33892	2.2436	0.136202
Scorelevel					
Racegroup*Scorelevel	0.46845	5	0.09369	0.6202	0.684575
Error	23.41448	155	0.15106		

Univariate Tests of Significance for item13 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.49892	1	0.49892	2.9295	0.088972
Scorelevel					
Racegroup*Scorelevel	1.20130	5	0.24026	1.4108	0.223310
Error	26.39724	155	0.17030		

Univariate Tests of Significance for item14 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept	42.13636	1	42.13636	204.4155	0.000000
Racegroup	0.06608	1	0.06608	0.3206	0.572092
Scorelevel	3.62232	5	0.72446	3.5146	0.004884
Racegroup*Scorelevel	0.92780	5	0.18556	0.9002	0.482622
Error	31.95030	155	0.20613		

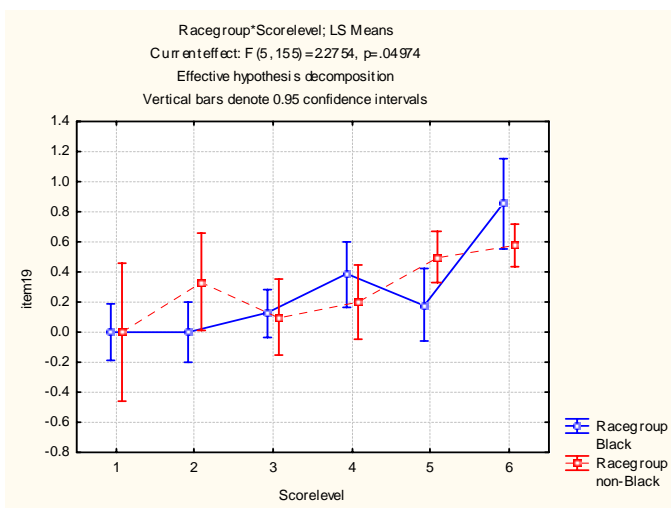
Univariate Tests of Significance for item15 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.04479	1	0.04479	0.30817	0.579606
Scorelevel					
Racegroup*Scorelevel	0.51810	5	0.10362	0.71289	0.614629
Error	22.52959	155	0.14535		

Univariate Tests of Significance for item16 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.40267	1	0.40267	2.1145	0.147934
Scorelevel					
Racegroup*Scorelevel	0.38356	5	0.07671	0.4028	0.846308
Error	29.51727	155	0.19043		

Univariate Tests of Significance for item17 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.08974	1	0.08974	0.51838	0.472618
Scorelevel					
Racegroup*Scorelevel	1.15769	5	0.23154	1.33744	0.251311
Error	26.83366	155	0.17312		

Univariate Tests of Significance for item18 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept	4.73254	1	4.732536	28.17106	0.000000
Racegroup	0.14834	1	0.148341	0.88302	0.348838
Scorelevel	2.30619	5	0.461239	2.74559	0.020895
Racegroup*Scorelevel	0.49917	5	0.099833	0.59427	0.704371
Error	26.03889	155	0.167993		

Univariate Tests of Significance for item19 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.02171	1	0.021711	0.13692	0.711865
Scorelevel					
Racegroup*Scorelevel					
Error	24.57715	155	0.158562		



Univariate Tests of Significance for item20 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.41874	1	0.418744	2.30493	0.131001
Scorelevel	1.76241	5	0.352482	1.94019	0.090716
Racegroup*Scorelevel	0.43639	5	0.087277	0.48041	0.790495
Error	28.15940	155	0.181674		

Univariate Tests of Significance for item21 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept	3.18230	1	3.182297	23.67480	0.000003
Racegroup	0.51155	1	0.511547	3.80567	0.052883
Scorelevel	1.47690	5	0.295381	2.19750	0.057283
Racegroup*Scorelevel	0.75733	5	0.151466	1.12683	0.348459
Error	20.83465	155	0.134417		

Univariate Tests of Significance for item22 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.00649	1	0.006487	0.04782	0.827181
Scorelevel					
Racegroup*Scorelevel	0.58848	5	0.117696	0.86765	0.504349
Error	21.02561	155	0.135649		

Univariate Tests of Significance for item23 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.03178	1	0.031780	0.21638	0.642464
Scorelevel					
Racegroup*Scorelevel	0.29710	5	0.059420	0.40457	0.845103
Error	22.76517	155	0.146872		

Univariate Tests of Significance for item24 Sigma-restricted parameterization Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept					
Racegroup	0.00016	1	0.000164	0.00119	0.972511
Scorelevel					
Racegroup*Scorelevel	0.48653	5	0.097306	0.70591	0.619828
Error	21.36599	155	0.137845		

Effect	Univariate Tests of Significance for item25 Sigma-restricted parameterization Effective hypothesis decomposition				
	SS	Degr. of Freedom	MS	F	p
Intercept	1.74984	1	1.749844	15.57670	0.000120
Racegroup	0.03311	1	0.033115	0.29478	0.587954
Scorelevel	1.99178	5	0.398357	3.54608	0.004600
Racegroup*Scorelevel	0.80953	5	0.161906	1.44125	0.212487
Error	17.41228	155	0.112337		