



**Количественные и качественные  
методы в исследовании развития**

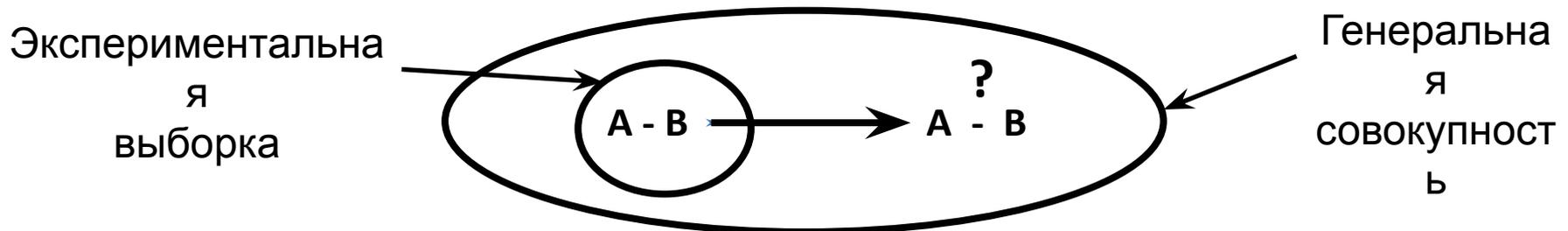
# Раздел 2: Общие принципы статистического анализа данных



# Раздел 2: Общие принципы статистического анализа данных

## Основные понятия статистического анализа данных:

1. **Величина** зависимости - количественное выражение зависимости;
2. **Значимость** зависимости ( $p$ ), которая определяет, насколько можно доверять полученному результату.



Результат считается значимым, если вероятность ошибки не превышает 5% ( $p < 0,05$ )

# Раздел 2: Общие принципы статистического анализа данных

## Тип шкалы измерения:

1. Номинальная шкала (*nominal*);
2. Порядковая (ранговая) шкала (*ordinal*);
3. Шкала интервалов (*interval*);
4. Шкала отношений (*ratio, scale*).



# Раздел 2: Общие принципы статистического анализа данных

Тип шкалы измерения:

A - 1

B - 2

C - 3

D - 4



# Раздел 2: Общие принципы статистического анализа данных

## Мода, медиана, среднее и дисперсия:

№	Пол	Возраст начала курения	№	Пол	Возраст начала курения	№	Пол	Возраст начала курения
1	М	11	13	Ж	12	25	Ж	13
2	М	8	14	Ж	10	26	Ж	11
3	М	12	15	Ж	12	27	М	13
4	М	6	16	М	12	28	М	7
5	Ж	13	17	Ж	14	29	М	10
6	М	12	18	М	7	30	Ж	6
7	Ж	11	19	М	10	31	М	12
8	Ж	10	20	М	14	32	М	11
9	М	12	21	М	10	33	М	13
10	М	15	22	М	8	34	Ж	12
11	Ж	12	23	Ж	11	35	М	10
12	М	9	24	М	12			

# Раздел 2: Общие принципы статистического анализа данных

Мода:

Возраст начала курения	Частота
6	2
7	2
8	2
9	1
10	6
11	5
12	10
13	4
14	2
15	1
<b>Всего</b>	<b>35</b>

Среднее: 10,89



## Раздел 2: Общие принципы статистического анализа данных

### Медиана:

<b>Возраст начала курения</b>	<b>Частота</b>	<b>Накопленная частота</b>	<b>%</b>
6	2	2	5,7
7	2	4	11,4
8	2	6	17,1
9	1	7	20,0
10	6	13	37,1
11	5	18	51,4
12	10	28	80,0
13	4	32	91,4
14	2	34	97,1
15	1	35	100,0
<b>Всего</b>	<b>35</b>		

## Раздел 2: Общие принципы статистического анализа данных

Дисперсия: Частота \* (Возраст – Среднее)<sup>2</sup> / (число значений - 1)

Возраст начала курения	Частота	(Возраст – Среднее)	(Возраст – Среднее) <sup>2</sup>	Частота * (Возраст – Среднее) <sup>2</sup>
6	2	-4,89	23,91	47,82
7	2	-3,89	15,13	30,26
8	2	-2,89	8,35	16,70
9	1	-1,89	3,57	3,57
10	6	-0,89	0,79	4,74
11	5	0,11	0,01	0,05
12	10	1,11	1,23	12,30
13	4	2,11	4,45	17,80
14	2	3,11	9,67	19,34
15	1	4,11	16,89	16,89
<b>Всего</b>	<b>35</b>			<b>∑ = 169,47 (4,98)</b>



# Раздел 2: Общие принципы статистического анализа данных

## Внесение данных:

The screenshot displays the PASW Statistics Data Editor interface. The main window shows a list of variables with the following columns: Name, Type, Width, Decimals, Label, Values, Missing, Columns, Align, Measure, and Role. The 'gender' variable is selected, and its 'Values' column contains 'None'. A 'Value Labels' dialog box is open, showing the 'Value' field set to '2' and the 'Label' field set to 'woman'. The dialog also includes an 'Add' button, a 'Change' button, a 'Remove' button, and a list of existing labels containing '1 = "man"'. The 'OK', 'Cancel', and 'Help' buttons are at the bottom of the dialog.

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	number	Numeric	8	0		None	None	8	Center	Nominal	Input
2	gender	Numeric	8	0		None	None	8	Right	Nominal	Input
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											

Value Labels dialog box:

Value Labels

Value: 2

Label: woman

1 = "man"

Buttons: Add, Change, Remove, Spelling..., OK, Cancel, Help

# Раздел 2: Общие принципы статистического анализа данных

## Внесение данных:

The screenshot shows the PASW Statistics Data Editor interface in Variable View. The main table contains the following data:

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	number	Numeric	8	0		None	None	8	Center	Nominal	Input
2	gender	Numeric	8	0		{1, man}...	None	8	Center	Nominal	Input
3	age	Numeric	8	0		None	None	8	Center	Scale	Input
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											

The interface includes a menu bar (File, Edit, View, Data, Transform, Analyze, Direct Marketing, Graphs, Utilities, Add-ons, Window, Help) and a toolbar with various icons. The status bar at the bottom indicates 'PASW Statistics Processor is ready' and the system clock shows 3:07.

# Раздел 2: Общие принципы статистического анализа данных

## Внесение данных:

The screenshot shows the PASW Statistics Data Editor interface. The main window displays a data table with 18 rows and 19 columns. The first three columns are labeled 'number', 'gender', and 'age'. The remaining 16 columns are labeled 'var'. The data is as follows:

	number	gender	age	var														
1	1	man	11															
2	2	man	8															
3	3	man	12															
4	4	man	6															
5	5	woman	13															
6	6	man	12															
7	7	woman	11															
8	8	woman	10															
9	9	man	12															
10	10	man	15															
11	11	woman	12															
12	12	man	9															
13	13	woman	12															
14	14	woman	10															
15	15	woman	12															
16	16	man	12															
17	17	woman	14															
18	18	man	7															

The interface includes a menu bar (File, Edit, View, Data, Transform, Analyze, Direct Marketing, Graphs, Utilities, Add-ons, Window, Help) and a toolbar with various icons. The status bar at the bottom indicates 'PASW Statistics Processor is ready' and the system clock shows 'EN 3:25'.

# Раздел 2: Общие принципы статистического анализа данных

## Описание данных:

The screenshot shows the PASW Statistics Data Editor interface. The main window displays a data table with 18 rows and 4 columns. The first two columns are labeled 'number' and contain values from 1 to 18. The third and fourth columns contain categorical data: 'woman' and 'man' for rows 13-18. The 'Analyze' menu is open, and the 'Frequencies...' option is selected. The software title bar indicates the file is 'Untitled1 [DataSet0] - PASW Statistics Data Editor'. The status bar at the bottom shows 'PASW Statistics Processor is ready' and the system clock is 3:32.

	number		
1	1		
2	2		
3	3		
4	4		
5	5		
6	6		
7	7		
8	8		
9	9		
10	10		
11	11		
12	12		
13	13	woman	12
14	14	woman	10
15	15	woman	12
16	16	man	12
17	17	woman	14
18	18	man	7

# Раздел 2: Общие принципы статистического анализа данных

## Описание данных:

The screenshot shows the PASW Statistics Data Editor interface. The main window displays a data table with 18 rows and 4 columns: 'number', 'gender', 'age', and 'var'. The data is as follows:

	number	gender	age
1	1	man	11
2	2	man	8
3	3	man	12
4	4	man	6
5	5	woman	13
6	6	man	12
7	7	woman	11
8	8	woman	10
9	9	man	12
10	10	man	15
11	11	woman	12
12	12	man	9
13	13	woman	12
14	14	woman	10
15	15	woman	12
16	16	man	12
17	17	woman	14
18	18	man	7

Two dialog boxes are open over the data table:

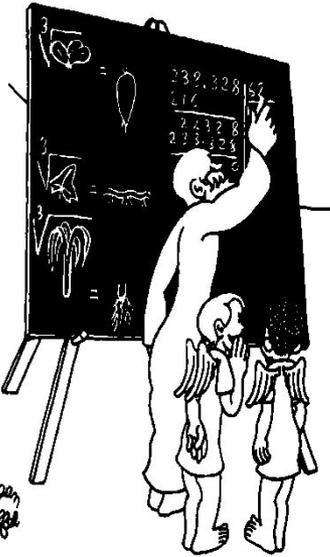
- Frequencies**: This dialog box has 'number' and 'gender' in the left list and 'age' in the 'Variable(s):' list on the right. The 'Display frequency tables' checkbox is checked. Buttons for 'OK', 'Paste', 'Reset', and 'Cancel' are at the bottom.
- Frequencies: Statistics**: This dialog box shows options for statistical analysis. Under 'Percentile Values', 'Quartiles' is checked. Under 'Central Tendency', 'Mean', 'Median', and 'Mode' are checked. Under 'Dispersion', 'Std. deviation', 'Variance', and 'Range' are checked. The 'Continue', 'Cancel', and 'Help' buttons are at the bottom.

# Раздел 2: Общие принципы статистического анализа данных

## Statistics

### Описание данных:

age		
N	Valid	35
	Missing	0
Mean		10,89
Median		11,00
Mode		12
Std. Deviation		2,233



		Age			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	6	2	5,7	5,7	5,7
	7	2	5,7	5,7	11,4
	8	2	5,7	5,7	17,1
	9	1	2,9	2,9	20,0
	10	6	17,1	17,1	37,1
	11	5	14,3	14,3	51,4
	12	10	28,6	28,6	80,0
	13	4	11,4	11,4	91,4
	14	2	5,7	5,7	97,1
	15	1	2,9	2,9	100,0
	Total	35	100,0	100,0	

# Раздел 2: Общие принципы статистического анализа данных

## Графическое представление данных:

The screenshot shows the PASW Statistics Data Editor interface. The main window displays a data table with 18 rows and 4 columns. The first two columns are labeled 'number' and contain values from 1 to 18. The third and fourth columns contain categorical and numerical data respectively.

	number		
1	1		
2	2		
3	3		
4	4		
5	5		
6	6		
7	7		
8	8		
9	9		
10	10		
11	11		
12	12		
13	13	woman	12
14	14	woman	10
15	15	woman	12
16	16	man	12
17	17	woman	14
18	18	man	7

The 'Analyze' menu is open, showing various statistical options. The 'Frequencies...' option is selected. The 'Data View' tab is active at the bottom left. The status bar at the bottom right indicates 'PASW Statistics Processor is ready' and the system clock shows '3:32'.

# Раздел 2: Общие принципы статистического анализа данных

## Графическое представление данных:

The screenshot displays the PASW Statistics Data Editor interface. The main window shows a data table with 18 rows and 17 columns. The first three columns are labeled 'number', 'gender', and 'age', with the remaining columns labeled 'var'. The data is as follows:

	number	gender	age	var													
1	1	man															
2	2	man															
3	3	man															
4	4	man															
5	5	woman															
6	6	man															
7	7	woman															
8	8	woman															
9	9	man	12														
10	10	man	15														
11	11	woman	12														
12	12	man	9														
13	13	woman	12														
14	14	woman	10														
15	15	woman	12														
16	16	man	12														
17	17	woman	14														
18	18	man	7														

Two dialog boxes are open over the data table:

- Frequencies**: This dialog box is used to generate frequency tables. It shows the variable 'number' selected in the left pane and 'gender' selected in the 'Variable(s):' pane. Buttons for 'Statistics...', 'Charts...', 'Format...', and 'Bootstrap...' are visible on the right. At the bottom, there are 'OK', 'Paste', 'Reset', 'Cancel', and 'Help' buttons.
- Frequencies: Charts**: This dialog box allows for selecting a chart type. Under 'Chart Type', 'Pie charts' is selected. There is a checkbox for 'Show normal curve on histogram' which is checked. Under 'Chart Values', 'Frequencies' is selected. Buttons for 'Continue', 'Cancel', and 'Help' are at the bottom.

The bottom of the screen shows the Windows taskbar with the Start button, several application icons, and the system tray displaying 'PASW Statistics Processor is ready' and the time '17:16'.

# Раздел 2: Общие принципы статистического анализа данных

## Графическое представление данных:

The screenshot displays the PASW Statistics Data Editor interface. On the left, a data grid shows columns for 'number' and 'gender'. A 'Chart Editor' window is open, showing a pie chart titled 'gender' with two segments: a blue segment representing 'man' at 63% and a green segment representing 'woman' at 37%. A 'Properties' dialog box is open over the chart, showing the 'Text Style' tab. The dialog box displays the text 'AaBbCc 123' and allows for font family (SansSerif), style (Bold), size (14), and color selection. The status bar at the bottom indicates 'PASW Statistics Processor is ready' and the time '17:40'.

number	gender
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18

number	gender
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18

# Раздел 2: Общие принципы статистического анализа данных

## Графическое представление данных:

The screenshot displays the PASW Statistics Data Editor interface. The main window shows a data table with 18 rows and 17 columns. The first four columns are labeled 'number', 'gender', 'age', and 'var'. The data is as follows:

	number	gender	age	var												
1	1	man	11													
2	2	man	8													
3	3	man	12													
4	4	man	6													
5	5	woman	13													
6	6	man	12													
7	7	woman	11													
8	8	woman	10													
9	9	man	12													
10	10	man	15													
11	11	woman	12													
12	12	man	9													
13	13	woman	12													
14	14	woman	10													
15	15	woman	12													
16	16	man	12													
17	17	woman	14													
18	18	man	7													

Two dialog boxes are open over the data table:

- Frequencies**: This dialog box is used to select variables for analysis. The 'number' and 'gender' variables are listed on the left, and the 'age' variable is selected in the 'Variable(s):' box on the right. Buttons for 'Statistics...', 'Charts...', 'Format...', and 'Bootstrap...' are visible on the right side of the dialog.
- Frequencies: Charts**: This dialog box allows for selecting a chart type. The 'Histograms' option is selected under the 'Chart Type' section. The 'Show normal curve on histogram' checkbox is checked. Under the 'Chart Values' section, the 'Frequencies' radio button is selected.

# Раздел 2: Общие принципы статистического анализа данных

## Графическое представление данных:

SPSS Statistics Data Editor window showing a histogram of the 'age' variable. The histogram is displayed in the Chart Editor, and the Properties dialog box is open, showing the Scale tab.

The data table shows the following values for the 'age' variable:

Case	age
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18

The histogram shows the frequency distribution of the 'age' variable. The x-axis is labeled 'age' and ranges from 6 to 15. The y-axis is labeled 'Frequency' and ranges from 0 to 10. The bars represent the frequency of each age value, with a normal distribution curve overlaid. The mean is 10,89, the standard deviation is 2,233, and the sample size is N = 35.

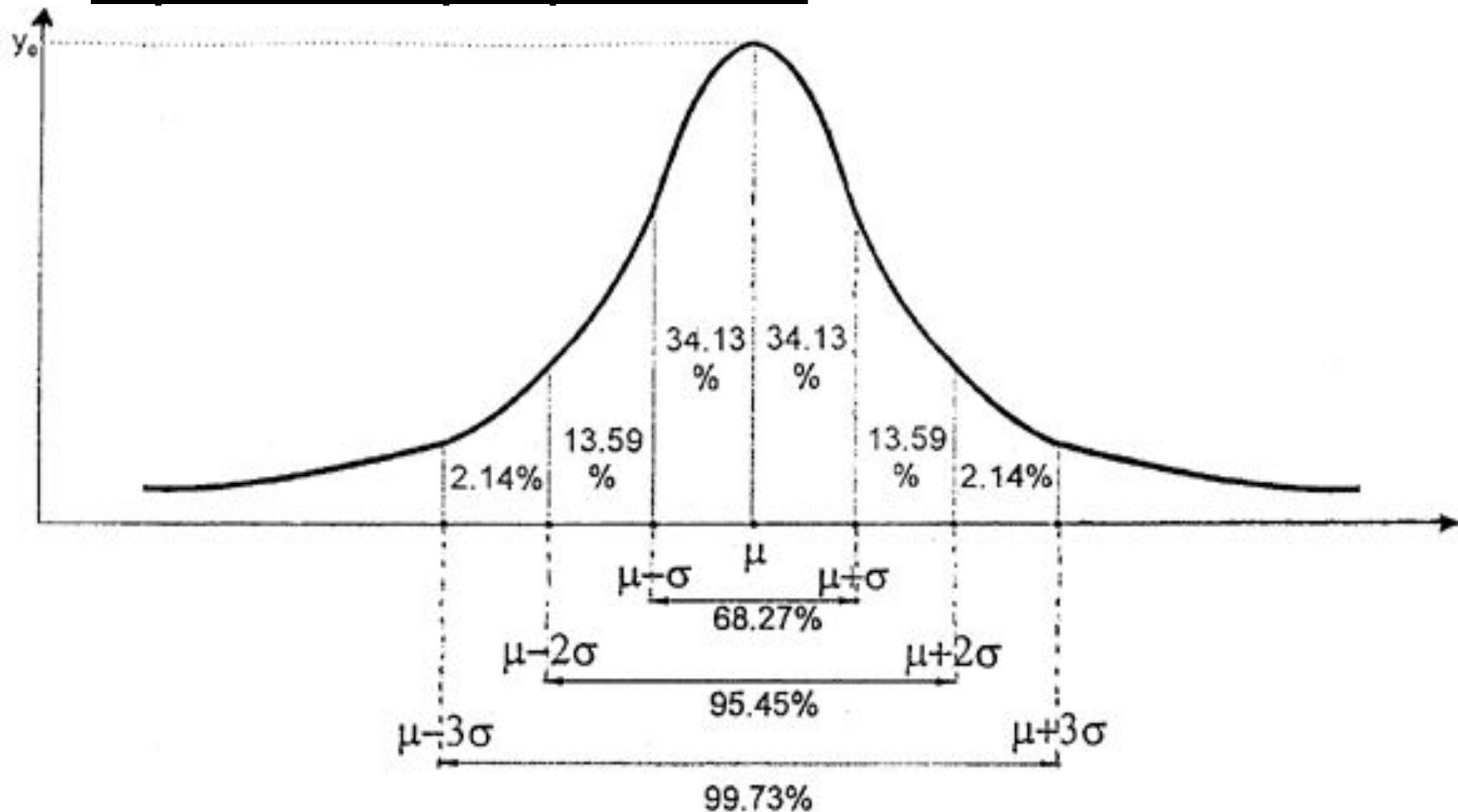
The Properties dialog box (Scale tab) shows the following settings:

- Range: Auto (selected), Custom (6, 16), Display line at origin (unchecked)
- Type: Linear (selected), Logarithmic (Base: 10, Safe), Power (Exponent: 0,5, Safe)
- Lower margin (%): 5, Upper margin (%): 5

Buttons: Apply, Close, Help

# Раздел 2: Общие принципы статистического анализа данных

## Нормальность распределения:



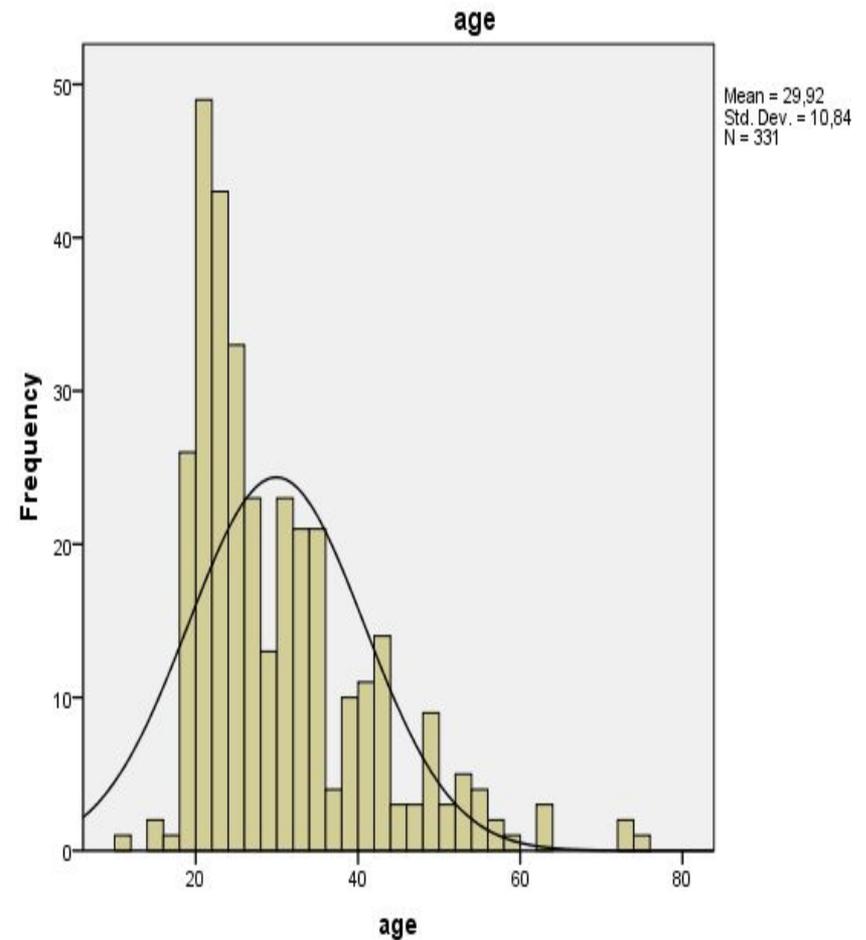
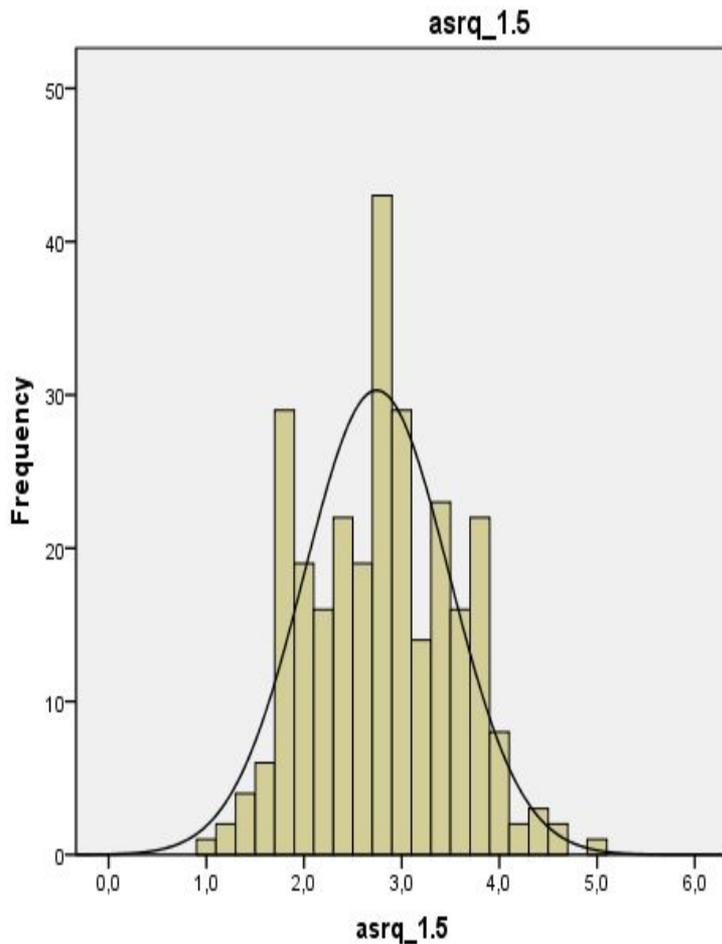
# Раздел 2: Общие принципы статистического анализа данных

## Графическая оценка нормальности распределения:

1. *Непрерывность распределения* - отсутствие в нем пропусков.
2. *Одно- или мультимодальность* – у нормального распределения только одна вершина.
3. *Ассиметрия (skewness)* – отклонение вершины от центра (по модулю  $<$  двойной станд. ошибки).
4. *Экцесс (kurtosis)* – «вытянутость» распределения, его относительная высота (по модулю  $<$  двойной стандартной ошибки).

# Раздел 2: Общие принципы статистического анализа данных

## Нормальность распределения:



# Раздел 2: Общие принципы статистического анализа данных

The screenshot shows the PASW Statistics Data Editor interface. The main window displays a data table with 18 rows and 4 columns. The first two columns are labeled 'number' and contain values from 1 to 18. The third and fourth columns contain categorical data: 'woman' and 'man' for rows 13-18, and numerical values (12, 10, 12, 12, 14, 7) for rows 13-18. The 'Analyze' menu is open, showing various statistical options. The 'Frequencies...' option is highlighted. The status bar at the bottom indicates 'PASW Statistics Processor is ready' and the time is 3:32.

	number		
1	1		
2	2		
3	3		
4	4		
5	5		
6	6		
7	7		
8	8		
9	9		
10	10		
11	11		
12	12		
13	13	woman	12
14	14	woman	10
15	15	woman	12
16	16	man	12
17	17	woman	14
18	18	man	7

Visible: 3 of 3 Variables

Frequency...

PASW Statistics Processor is ready

EN 3:32

# Раздел 2: Общие принципы статистического анализа данных

\*Untitled1 [DataSet0] - PASW Statistics Data Editor

File Edit View Data Transform Analyze Direct Marketing Graphs Utilities Add-ons Window Help

1: number 1 Visible: 4 of 4 Variables

	number	gender	age	smoke	var											
1	1	man														
2	2	man														
3	3	man														
4	4	man														
5	5	woman														
6	6	man														
7	7	woman														
8	8	woman														
9	9	man	12	yes												
10	10	man	15	no												
11	11	woman	12	yes												
12	12	man	9	no												
13	13	woman	12	yes												
14	14	woman	10	no												
15	15	woman	12	yes												
16	16	man	12	no												
17	17	woman	14	yes												
18	18	man	7	no												

1: number 1

Visible: 4 of 4 Variables

18

Data View Variable View

PASW Statistics Processor is ready

EN 2:54

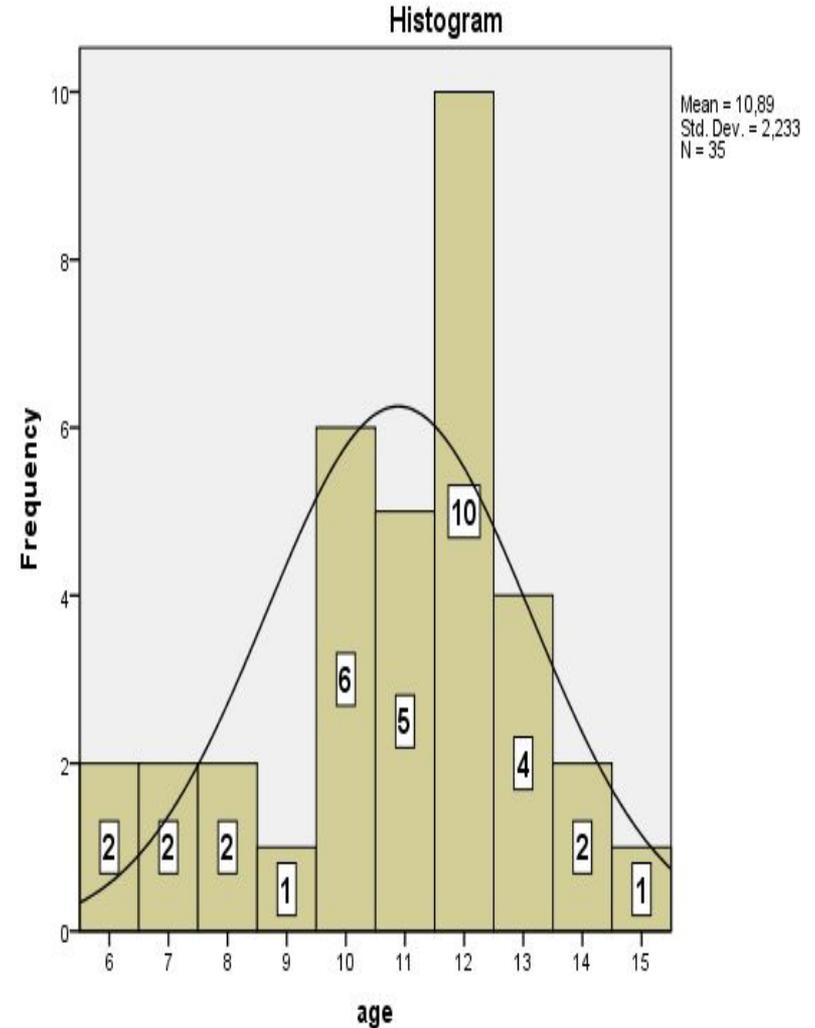
The screenshot shows the PASW Statistics Data Editor interface. The main window displays a data table with 18 rows and 17 columns. The first two columns are 'number' and 'gender'. The third column is 'age', and the fourth is 'smoke'. The remaining columns are labeled 'var'. Two dialog boxes are open over the data table. The 'Frequencies' dialog box is in the foreground, showing the 'number' variable selected in the 'Variable(s):' list. The 'Frequencies: Statistics' dialog box is also open, showing various statistical options. The 'Percentile Values' section has 'Quartiles' checked. The 'Central Tendency' section has 'Mean', 'Median', 'Mode', and 'Sum' checked. The 'Dispersion' section has 'Std. deviation', 'Variance', and 'Range' checked. The 'Distribution' section has 'Skewness' and 'Kurtosis' checked. The 'Values are group midpoints' checkbox is also checked. The 'Cut points for:' field is set to '10 equal groups'. The 'Percentile(s):' field is empty. The 'Add', 'Change', and 'Remove' buttons are visible. The 'Continue', 'Cancel', and 'Help' buttons are at the bottom of the dialog box.

# Раздел 2: Общие принципы статистического анализа данных

## Statistics

age

N	Valid	35
	Missing	0
Skewness		-,638
Std. Error of Skewness		,398
Kurtosis		-,009
Std. Error of Kurtosis		,778



# Раздел 2: Общие принципы статистического анализа данных

The screenshot shows the PASW Statistics Data Editor interface. The main window displays a data table with 18 rows and 5 columns. The first column is labeled 'number' and contains values from 1 to 18. The second column is labeled 'number' and contains values from 1 to 18. The third column contains categorical values: 'woman', 'woman', 'woman', 'man', 'woman', 'man', 'man'. The fourth column contains numerical values: 12, 10, 12, 12, 14, 7. The fifth column contains categorical values: 'yes', 'no', 'yes', 'no', 'yes', 'no'. The 'Analyze' menu is open, showing various statistical options. The 'Crosstabs...' option is highlighted. The status bar at the bottom indicates 'PASW Statistics Processor is ready' and the time is 22:56.

number	number													
1	1													
2	2													
3	3													
4	4													
5	5													
6	6													
7	7													
8	8													
9	9													
10	10													
11	11													
12	12													
13	13	woman	12	yes										
14	14	woman	10	no										
15	15	woman	12	yes										
16	16	man	12	no										
17	17	woman	14	yes										
18	18	man	7	no										

# Раздел 2: Общие принципы статистического анализа данных

The screenshot displays the PASW Statistics Data Editor interface. The main window shows a data table with 18 rows and 17 columns. The first four columns are labeled 'number', 'gender', 'age', and 'smoke'. The remaining columns are labeled 'var'. The data is as follows:

	number	gender	age	smoke	var											
1	1	man	11	yes												
2	2	man	8	no												
3	3	man	12	yes												
4	4	man	6	no												
5	5	woman	13	yes												
6	6	man	12	no												
7	7	woman	11	yes												
8	8	woman	10	no												
9	9	man	12	yes												
10	10	man	15	no												
11	11	woman	12	yes												
12	12	man	9	no												
13	13	woman	12	yes												
14	14	woman	10	no												
15	15	woman	12	yes												
16	16	man	12	no												
17	17	woman	14	yes												
18	18	man	7	no												

A 'Crosstabs' dialog box is open in the foreground, showing the following configuration:

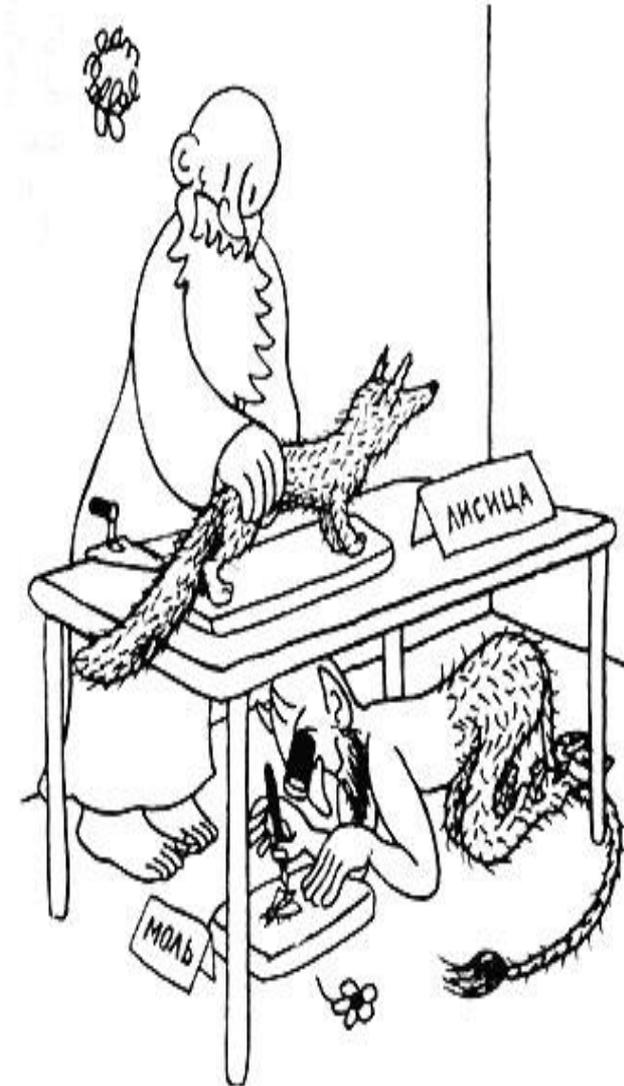
- Row(s): gender
- Column(s): smoke
- Layer 1 of 1: (empty)
- Display clustered bar charts:
- Suppress tables:
- Buttons: OK, Paste, Reset, Cancel, Help, Exact..., Statistics..., Cells..., Format..., Bootstrap...

# Раздел 2: Общие принципы статистического анализа данных

## gender \* smoke Crosstabulation

Count

		smoke		Total
		yes	no	
gender	man	10	12	22
	woman	8	5	13
Total		18	17	35



## Раздел 2: Общие принципы статистического анализа данных

		тип младшего сиблинга				Итого
		1	2	3	4	
тип старшего сиблинга	1	12	1	0	0	13
	2	2	6	2	2	12
	3	1	3	2	0	6
	4	0	0	0	2	2
Итого		15	10	4	4	33

## Раздел 2: Общие принципы статистического анализа данных

### Ключи опросника ШБУ:

Шкала	Вопросы
Доброжелательность окружающего мира	5* 10* 13* 15 18* 19* 27* 31 33*
Справедливость окружающего мира	6* 11 21 22 29* 34
Образ Я	2* 7* 12 17 23 35 37*
Удача	3 8* 14* 20* 25* 28 32 36
Уверенность в контроле над своей жизнью	1 4 9 16 24* 26* 30

**Спасибо за  
внимание  
и другие ВПФ**



*Jean  
Eggs*