

Part II

Individual Decision Making

Individual Decision Making

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Exercise 1

Example: lottery

- ▶ endowment: E
- ▶ the lottery yields:
 - ▶ $x(1 + a)$ with probability p
 - ▶ 0 with probability $1 - p$
- ▶ task: choose x between 0 and E
- ▶ random draw: n between 0 and 1
- ▶ payoff: $E - x + I[n \leq p]x(1 + a)$

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Example: lottery

- ▶ endowment: E
- ▶ the lottery yields:
 - ▶ $x(1 + a)$ with probability p
 - ▶ 0 with probability $1 - p$
- ▶ task: choose x between 0 and E
- ▶ random draw: n between 0 and 1
- ▶ payoff: $E - x + I[n \leq p]x(1 + a)$

see **lottery.ztt**

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Plan of the treatment

1. **Background:** set the value of the variables

- ▶ **global variables:** same value for all subjects → E, p, a
- ▶ **“subject” variables:** possibly different values for different subjects → x, n

Plan of the treatment

1. **Background:** set the value of the variables
 - ▶ **global variables:** same value for all subjects → E, p, a
 - ▶ **“subject” variables:** possibly different values for different subjects → x, n
2. **Stage 1:** subjects make their choice → x

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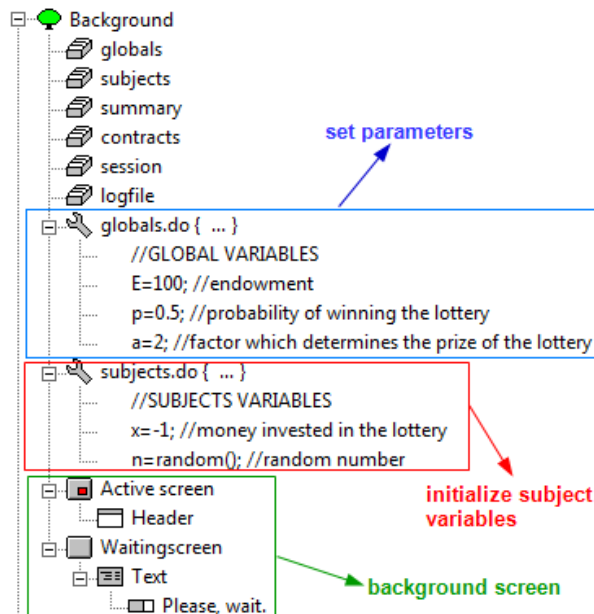
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Exercise 1

1. **Background:** set the value of the variables
 - ▶ **global variables:** same value for all subjects → E, p, a
 - ▶ **“subject” variables:** possibly different values for different subjects → x, n
2. **Stage 1:** subjects make their choice → x
3. **Stage 2:** results
 - ▶ compute subjects' payoffs (in a program, at the beginning of the stage)
 - ▶ show each subject his/her payoff on the screen (in the “Active screen” of the stage)

Background



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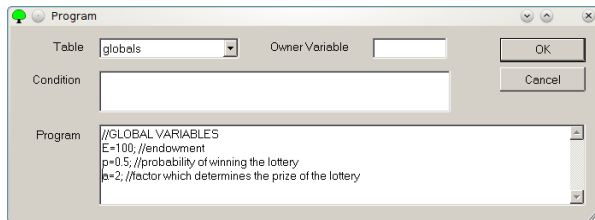
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Exercise 1

Programs - I

Set the global variables

- ▶ select the last table listed in the Background (logfile)
- ▶ from the menu, choose treatment → new program (ctrl+alt+p)

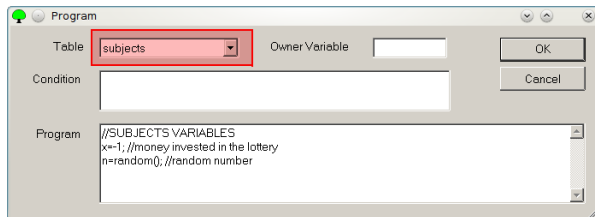


- ▶ choose “globals” in the field Table
- ▶ use // to insert comments

Programs - II

Set the “subject” variables

- ▶ Create another program which runs on the subjects table



Note: here we use the function `random()`.

- ▶ This generates a random number from a uniform distribution between 0 and 1.
- ▶ The random number will be *different* for *different subjects*.

Background screen

The Background also contains some information about what is displayed on subjects' screen.

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In the **Active screen** a header box is placed by default.

- ▶ the header box defines the top of the screen.
- ▶ to remove the header delete the header box from the Active screen in the Background

Header Box

Name: Header ☒ With frame

Width [p%]: Height [p%]: 10%

Distance to the margin [p%]: 0p

Adjustment of the remaining box: ☐ left ☒ top ☐ right ☐ bottom

Display condition:

☒ Show current period number ☒ Show total number of periods

Name of "Period":

Term for "out of":

Prefix for trial periods:

☒ Display time

Term for "Remaining time":

Term for "Please reach a decision":

OK Cancel

Background screen

The Background also contains some information about what is displayed on subjects' screen.

In the **Active screen** a header box is placed by default.

- ▶ the header box defines the top of the screen.
- ▶ to remove the header delete the header box from the Active screen in the Background

Header Box

Name: Header ☒ With frame

Width [p%]: 100

Height [p%]: 100

Distance to the margin [p%]: 0p

Adjustment of the remaining box:
☐ left ☒ top ☐ right ☐ bottom

Display condition:

☒ Show current period number
☒ Show total number of periods

Name of "Period": Periode

Term for "out of": von

Prefix for trial periods: Probe

☒ Display time

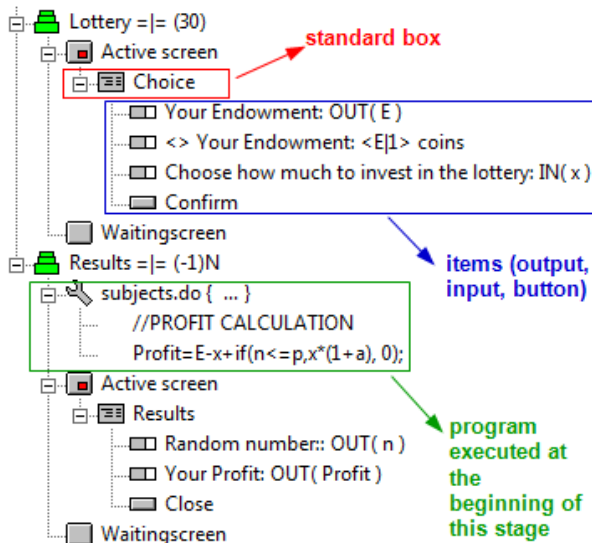
Term for "Remaining time": Verbleibende Zeit [sec]

Term for "Please reach a decision": Bitte entscheiden Sie sich jetzt!

OK Cancel

The **Waiting screen** contains the message shown to subjects when they have to wait.

Stages



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Exercise 1

Create a new stage

Select the Background icon, then from the menu, choose: Treatment → New Stage (**ctrl+alt+s**)

Stage

Name: Lottery [OK] [Cancel]

Start:

- ☒ Wait for all
- ☐ Start if possible
- ☐ Start if...

Number of subjects in Stage:

- ☐ At most one per group in stage

Leave stage after timeout:

- ☒ If no input
- ☐ Yes
- ☐ No

Timeout: 30

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Exercise 1

Create a new stage

Select the Background icon, then from the menu,
choose: Treatment → New Stage (**ctrl+alt+s**)

Stage

Name: Lottery OK Cancel

Start:

- ☒ Wait for all
- ☐ Start if possible
- ☐ Start if...

Number of subjects in Stage:

- ☐ At most one per group in stage

Leave stage after timeout:

- ☒ If no input
- ☐ Yes
- ☐ No

Timeout: 30

- Choose a meaningful name for the stage (e.g. “Lottery”)

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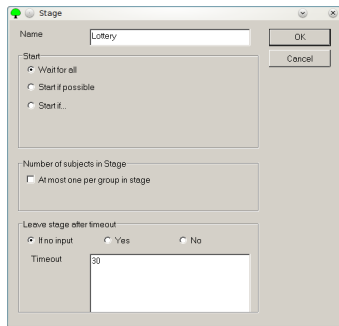
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Exercise 1

Create a new stage

Select the Background icon, then from the menu, choose: Treatment → New Stage (**ctrl+alt+s**)



- ▶ Choose a meaningful name for the stage (e.g. “Lottery”)
- ▶ Set the **timing** (wait for all, start if possible, ...)

Create a new stage

Select the Background icon, then from the menu, choose: Treatment → New Stage (**ctrl+alt+s**)

- ▶ Choose a meaningful name for the stage (e.g. “Lottery”)
- ▶ Set the **timing** (wait for all, start if possible, ...)
- ▶ Set the **timeout**: choose “No” if you wish to record the time without forcing subjects to leave the stage

Create a new stage

Select the Background icon, then from the menu, choose: Treatment → New Stage (**ctrl+alt+s**)

- ▶ Choose a meaningful name for the stage (e.g. “Lottery”)
- ▶ Set the **timing** (wait for all, start if possible, ...)
- ▶ Set the **timeout**: choose “No” if you wish to record the time without forcing subjects to leave the stage

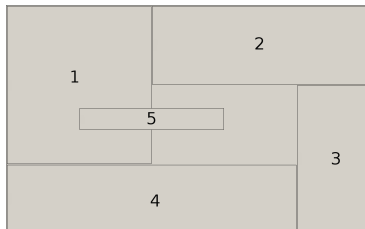
Create a second stage named “Results”.

the Active screen

- ▶ the Active screen of a Stage defines the information displayed on subjects' screens
- ▶ If you do not want to use the background screen in some stages, click on Active screen and unmark "Background screen is being used"
- ▶ the Active screen contains Boxes
 - ▶ i.e. rectangles that organize the space on the screen
- ▶ Boxes contain Items, which can be
 - ▶ pieces of information
 - ▶ input fields
 - ▶ figures
 - ▶ etc.

Screen layout

- ▶ Set the dimension and position of each box.
- ▶ Boxes can overlap



Name	1	<input checked="" type="checkbox"/> with Frame		
Width [p/%]	<input type="text"/>	Distance to the margin [p/%]	<input type="text"/>	
Height [p/%]	<input type="text"/>	Adjustment of the remaining box	<input type="text"/>	
		<input type="checkbox"/> left <input type="checkbox"/> top <input type="checkbox"/> right	<input type="checkbox"/> bottom	
			60%	
			30%	

Name	2	<input checked="" type="checkbox"/> with Frame		
Width [p/%]	<input type="text"/>	Distance to the margin [p/%]	<input type="text"/>	
Height [p/%]	<input type="text"/>	Adjustment of the remaining box	<input type="text"/>	
		<input type="checkbox"/> left <input type="checkbox"/> top <input type="checkbox"/> right	<input type="checkbox"/> bottom	
			40%	
			65%	

Name	3	<input checked="" type="checkbox"/> with Frame		
Width [p/%]	<input type="text"/>	Distance to the margin [p/%]	<input type="text"/>	
Height [p/%]	<input type="text"/>	Adjustment of the remaining box	<input type="text"/>	
		<input type="checkbox"/> left <input type="checkbox"/> top <input type="checkbox"/> right	<input type="checkbox"/> bottom	
			35%	
			80%	

Name	4	<input checked="" type="checkbox"/> with Frame		
Width [p/%]	<input type="text"/>	Distance to the margin [p/%]	<input type="text"/>	
Height [p/%]	<input type="text"/>	Adjustment of the remaining box	<input type="text"/>	
		<input type="checkbox"/> left <input type="checkbox"/> top <input type="checkbox"/> right	<input type="checkbox"/> bottom	
			70%	
			20%	

Name	5	<input checked="" type="checkbox"/> with Frame		
Width [p/%]	<input type="text"/>	Distance to the margin [p/%]	<input type="text"/>	
Height [p/%]	<input type="text"/>	Adjustment of the remaining box	<input type="text"/>	
		<input type="checkbox"/> left <input type="checkbox"/> top <input type="checkbox"/> right	<input type="checkbox"/> bottom	
			45%	
			20%	
			40%	
			45%	

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Create a Box

- ▶ Select Active Screen in the “Lottery” stage.
- ▶ From the menu, select Treatment → New Box → Standard Box (**ctrl+alt+d**)

The screenshot shows a dialog box titled "Standard Box" with the following fields and options:

- Name:** A text field containing "Choice".
- with Frame:** A checked checkbox.
- Width [p/%]:** An empty text field.
- Height [p/%]:** An empty text field.
- Distance to the margin [p/%]:** A group box containing four text fields, each with "20%".
- Adjustment of the remaining box:** A group box containing four checkboxes: "left", "top", "right", and "bottom".
- Display condition:** A large empty text area.
- Buttons:** A group box containing a 3x3 grid of radio buttons.
- Arrangement:** A group box containing two radio buttons: "In rows" and "In columns".
- OK and Cancel:** Two buttons on the right side of the dialog.

Output items

Output items: to convey information to the subjects.

Place output items in the “Choice” box

- ▶ select the box “Choice” in the “Lottery” stage
- ▶ from the menu, select Treatment→ New Item (ctrl+alt+i)

The screenshot shows a software interface for defining a choice box. It has three main sections: 'Label' with the text 'Your Endowment', 'Variable' with the letter 'E', and 'Layout' which contains a table. The table has a single row and a single column, with the row header 'E' and the column header '1'. At the bottom left of the layout section is an unchecked checkbox labeled 'Input'.

Output items

Output items: to convey information to the subjects.

Place output items in the “Choice” box

- ▶ select the box “Choice” in the “Lottery” stage
- ▶ from the menu, select Treatment → New Item (ctrl+alt+i)

Label: Your Endowment

Variable: E

Layout: 1

☐ Input

Output

- ▶ Label: “Your endowment”
- ▶ Variable: E
- ▶ Layout: 1 (0.1 for 1 decimal digit...)

Output items

Output items: to convey information to the subjects.

Place output items in the “Choice” box

- ▶ select the box “Choice” in the “Lottery” stage
- ▶ from the menu, select Treatment → New Item (ctrl+alt+i)

Label: Your Endowment

Variable: E

Layout: 1

☐ Input

Output

- ▶ Label: "Your endowment"
- ▶ Variable: E
- ▶ Layout: 1 (0.1 for 1 decimal digit...)
- ▶ You can use < > to insert variable values into labels:
Label: "< > Your Endowment: < E|1> coins."

Input items

Input items: to get inputs from subjects.

Create a new Item (ctrl+alt+i)

- ▶ Label: “Choose how much to invest in the lottery”
- ▶ Variable: x
- ▶ Layout: 1 (0.1 for 1 decimal digit...)

Input items

Input items: to get inputs from subjects.

Create a new Item (ctrl+alt+i)

- ▶ Label: “Choose how much to invest in the lottery”
- ▶ Variable: x
- ▶ Layout: 1 (0.1 for 1 decimal digit...)
- ▶ **check the Input box**
- ▶ Minimum: 0
- ▶ Maximum: E

Note: you can use variables here!

The screenshot shows the 'Item' dialog box with the following settings:

- Label:** Choose how much to invest in the lottery
- Variable:** x
- Layout:** 1
- Minimum:** 0
- Maximum:** E
- Input:** ☒
- Show value (value of variable or default):** ☐
- Empty allowed:** ☐
- Default:** (empty field)

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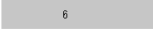
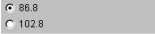









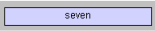


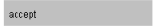
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Item layout

Layout	input variable	output variable
2		
!radio: 1 = "86.8"; 24 = "102.8";		
!radioline: 0="zero";5="five"; 6;		
!slider: 0 ="A"; 100= "B"; 101;		
!scrollbar: 0="L";100= "R";101;		
!checkbox:1="check me";		
!text: 1= "one"; 2 = "two"; 3 = "three"; 4 = "four"; 5 = "five"; 6 = "six"; 7 = "seven"; 8 = "eight"; 9 = "nine"; 10 = "ten";		
!button: 1 = "accept"; 0 = "reject";		

See the Reference Manual at page 30, and Part 6 for the new !string layout.

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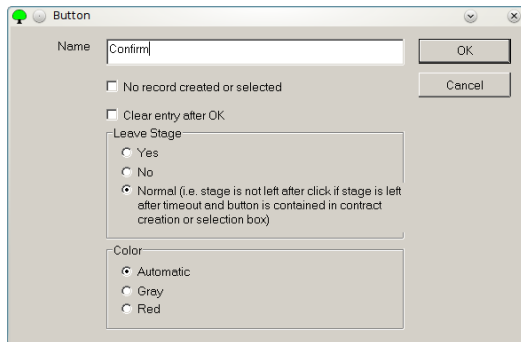
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Exercise 1

Confirm an input

Inputs are confirmed by clicking on a button.

To **add a button** in a box, from the menu, select
Treatment→ New Button (**ctrl+alt+b**)



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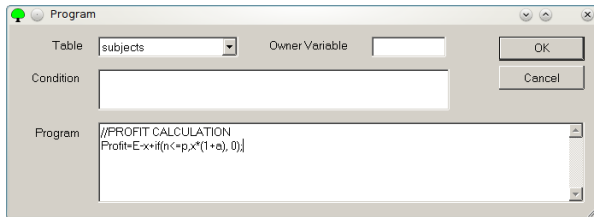
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Exercise 1

Profit calculation

Once the subjects' choices have been collected, the program should compute the profits.

Select the “Results” stage, and create a new program.



Note: here we use the “if” function:
`if(condition,T,F)` , which returns value

- ▶ T if the “condition” is true
- ▶ F if the “condition” is false

A complete list of available functions at page 45 of the Reference Manual.

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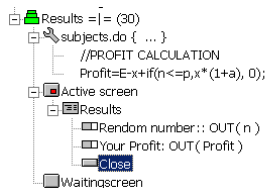
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Exercise 1

Results screen

In the Active Screen of the “Results” stage, create a new Standard Box, and name it “Results”.



- ▶ In this box, add an Item to display the **random number** n , with 2 decimal digits.
- ▶ Add a second Item to display the subject's **profit**.
- ▶ Add a Button to end the treatment.

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Test the treatment I

To set the **general parameters**:

- ▶ Double-click on the Background icon (the very first line of the program) to set the general parameters.
- ▶ **Exchange rate** = $1/n$ if n points equal 1 Euro.

General Parameters

Number of subjects: 1

Number of groups: 1

practice periods: 0

paying periods: 1

Exch. rate [Fr./ECU]: 1

Lump sum payment [ECU]: 0

Show up fee [Fr.]: 0

OK Cancel

Bankruptcy rules...

Compatibility

☐ first boxes on top

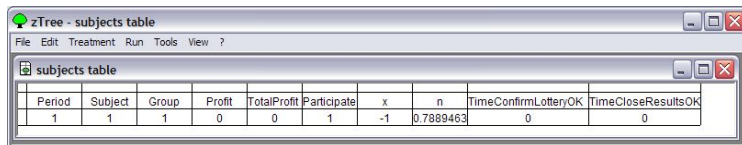
Options

☐ without Autoscope

Test the treatment II

From the z-Tree menu,

- ▶ select Run→ Start treatment (or press **F5**)
- ▶ select Run→ Stop clock (or press **F12**) to stop the time from running,
- ▶ select Run→ Restart clock (or press **Shift+F12**) to restart the time,
- ▶ select Run→ subjects table to monitor the subjects activity.



The screenshot shows a window titled "zTree - subjects table" with a menu bar (File, Edit, Treatment, Run, Tools, View, ?) and a toolbar. Below the toolbar is a sub-window titled "subjects table" containing a table with the following data:

Period	Subject	Group	Profit	TotalProfit	Participate	x	n	TimeConfirmLotteryOK	TimeCloseResultsOK
1	1	1	0	0	1	-1	0.7889463	0	0

Test the treatment III

To **stop** the execution of a treatment:

1. From the menu, choose Run→Stop after this period.
2. Open the clients table (Run→Clients table), then click at the top of the second column ("state"), so to select it all.
3. From the menu, choose Run→Leave stage, until all clients are marked as "ready".

2

Clients' Table

Shuffle Clients

Sort Clients

Save Client Order

Start Treatment F5

globals Table

subjects Table

contracts Table

summary Table

session Table

logfile Table

all Tables ▶

Stop Clock F12

Restart Clock Shift+F12

3

Leave Stage

1


Stop after this period

Replay Leaf From GameSafe

Restart All Clients

Restore Client Order

Reload database



The screenshot shows a window titled "Clients' Table". Inside is a table with three columns. The first column contains labels for clients. The second column, labeled "state", contains the text "*** Results ***". The third column, labeled "time", contains numerical values. A red arrow points to the "state" column header.

	state	time
6 clients	*** Results ***	-272
zLeaf_1	*** Results ***	-272
zLeaf_2	*** Results ***	-272
zLeaf_3	*** Results ***	-272
zLeaf_4	*** Results ***	-272
zLeaf_5	*** Results ***	-272
zLeaf_6	*** Results ***	-272

Testing the treatment

Questionnaires

A questionnaire is needed to generate payment file.

- ▶ select File→ New questionnaire

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A questionnaire is needed to generate payment file.

- ▶ select File→ New questionnaire
- ▶ select Questionnaire→ Language and select the language of your choice

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Questionnaires

A questionnaire is needed to generate payment file.

- ▶ select File→ New questionnaire
- ▶ select Questionnaire→ Language and select the language of your choice
- ▶ select Questionnaire→ New address form

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Questionnaires

A questionnaire is needed to generate payment file.

- ▶ select File→ New questionnaire
- ▶ select Questionnaire→ Language and select the language of your choice
- ▶ select Questionnaire→ New address form
- ▶ select Questionnaire→ New question form and name it "Empty"

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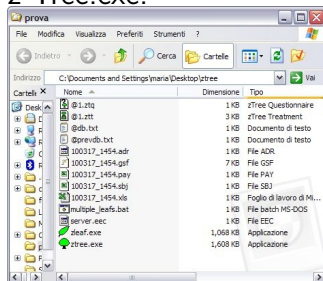
A questionnaire is needed to generate payment file.

- ▶ select File→ New questionnaire
- ▶ select Questionnaire→ Language and select the language of your choice
- ▶ select Questionnaire→ New address form
- ▶ select Questionnaire→ New question form and name it "Empty"

The Address Form is needed, but if you leave the fields First Name and Last Name empty the Address form will not be displayed. To start the questionnaire, select Run→ Start questionnaire (or press **F5**)

Files saved by z-Tree

Session data are saved in the directory containing z-Tree.exe:



.pay: the payment file, which lists the subjects' final profits including the show-up fee

.adr: subjects' addresses (from the Questionnaire)

.sbj: answers to questionnaire's questions, without subjects' names

.gsf: backup file, in case a crash occurs

.xls: contains all tables used in a session (subjects table, globals table, etc)

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.pay and .xls files

The **payment** file (.pay):

Subject	Computer	Interested	Name	Profit	Signature
1	zleaf1	OK	Bigoni, Maria	9.00	
2	zleaf2	OK	Doe, John	19.00	
3	zleaf3	OK	Smith, James	2.50	
4	zleaf4	OK	Johnson, Sarah	16.50	
Experiment	Z:\ztree\examples\100319_1112.pay			46.50	

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.pay and .xls files

The **payment** file (.pay):

Subject	Computer	Interested	Name	Profit	Signature
1	zleaf1	OK	Bigoni, Maria	9.00	
2	zleaf2	OK	Doe, John	19.00	
3	zleaf3	OK	Smith, James	2.50	
4	zleaf4	OK	Johnson, Sarah	16.50	
Experiment	Z:\ztree\examples\100319_1112.pay			46.50	

The **data** file (.xls):

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	100319_1112	1	globals	Period	NumPeriods	RepeatTreatment	E	p	a	2			
2	100319_1112	1	globals		1		0	100	0.5				
3	100319_1112	1	subjects	Period	Subject	Group	Profit	TotalProfit	Participate	x	n	TimeConfirmLotteryOK	TimeCloseResultsOK
4	100319_1112	1	subjects	1	1	1	90	90	1	10	0.67	7	99999
5	100319_1112	1	subjects	1	2	1	190	190	1	45	0.48	19	99999
6	100319_1112	1	subjects	1	3	1	25	25	1	75	0.97	12	99999
7	100319_1112	1	subjects	1	4	1	160	160	1	30	0.23	27	99999
8	100319_1112	1	summary	Period									
9	100319_1112	1	summary		1								
10	100319_1112	1	session	Subject	FinalProfit	ShowUpFee	ShowUpFeeInvested	MoneyAdded	MoneyToPay	MoneyEarned	Participate		
11	100319_1112	1	session	1	9	0	0	0	9	9	1		
12	100319_1112	1	session	2	19	0	0	0	19	19	1		
13	100319_1112	1	session	3	2.5	0	0	0	2.5	2.5	1		
14	100319_1112	1	session	4	16	0	0	0	16	16	1		

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How to use z-Tree data

Option 1: From the menu select Tools→ Separate tables. Select the .xls file generated by z-Tree and select Open. This generates one .xls file per each of the tables used in the session.

Option 2: for those who use **Stata**, Kan Takeuchi developed an .ado file to import z-Tree data directly into Stata.

`www.econ.hit-u.ac.jp/~kan/
research/ztreetostata/index.html`

Option 3: for those who use **R**, Oliver Kirchkamp developed a utility to import data from z-Tree into R. download.

`www.kirchkamp.de/lab/zTree.html`

Exercise 1: guess

see z-Tree Tutorial, page 25.

Subjects have to make a calculation.

They have to calculate the sine function for a randomly determined value: $\sin(C \cdot A/B)$

Subjects are paid according to the precision of their guess:

- ▶ Profit (in points):
 $100 * (1 - |\sin(C * A/B) - guess|)$
- ▶ A and B are random integer numbers between 1 and 10. They take different values for different subjects.
- ▶ C is equal to π (3.14...)

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Exercise 1: details

- ▶ Subjects cannot make negative profits (set the profit function accordingly).
- ▶ Do not include the header, nor the alert frame.
- ▶ Layout of the input variable: slider.
- ▶ Functions you need to use:
 - ▶ `abs()`: absolute value
 - ▶ `max(x,y)`: returns the maximum value between x and y
 - ▶ `pi()`: returns 3.1415...
 - ▶ `roundup(x,y)`: returns the smallest multiple of y that is greater or equal to x.
 - ▶ `sin(x)`: returns the sine of x.

Solution: `exercize_1.ztt`

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Exercise 1 - layout

A is equal to: 3

B is equal to: 2

C is equal to π (3.142).

Guess the value of $\sin(C \cdot A/B)$

-1 $\frac{1}{2}$ 1

OK