A COMPUTATIONAL APPROACH TO
COGNITIVE AND AFFECTIVE PROCESSES
IN MULTIPLE-TASK PERFORMANCE

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Experiment 1
Stimulus Identification
SCREEN - ONE
Executable file for repeat program on desktop

SCREEN - TWO
WELCOME SCREEN

Hello! You are welcome to a computerised simulation of an experiment on response time. This experiment is part of Ph.D. research titled "A computational approach to cognitive and affective factors of multiple task performance", being done by Mr. Rashmin Sompura. I express heartily thanks to you for your participation in the research!!!
SCREEN - THREE
INFORMATION SCREEN

Kindly give me your following details:

First Name : 
Middle Name :
Surname :
Birth date :
Age :
Gender :
Class :
Date of experiment :

screen size - active desktop
screen background - blue color
screen font color - yellow color
screen font size - 14
screen font type - times roman

should we put data check / above data should be repeated
against all the records / create a file name by first name

SCREEN - FOUR
INSTRUCTION SCREEN

This is a very simple experiment. Once you have understood the instruction, you shall be displayed a screen wherein you can press "START" to begin the trials. As soon as you press "START", a screen showing "GET READY" message will appear on the screen for about 5 seconds. Afterwards you shall be shown a screen with a rectangle on the screen centre. Please focus your attention on the centre of rectangle. The rectangle shall be displayed for about 2 seconds. Anytime during these 2 seconds any of the four characters i.e. '4', '5', 'd' or 'f' may be displayed withing the rectangle just for a part of a second or nothing may be displayed during these 2 seconds except the rectangle. Afterwards, you shall be asked to select the rectangle which has the character that you might have seen within the rectangle or to select the rectangle without any character in case nothing was displayed. You shall be asked to confirm whether the selected rectangle is the one that you show within the rectangle. If you click 'yes', you shall be given the next trial. Or else if you click 'no', you shall be allowed to reselect the appropriate rectangle and then you can click 'yes'. In all there shall be about two such blocks of trials. Is the instruction clear to you?

Yes
No

screen as screen three/if yes 'go to get ready' screen / if no 
repeat instruction screen
SCREEN - FIVE
EXAMPLE SCREEN

4 5 d f

NEXT

SCREEN - SIX
GET READY SCREEN

Display 'Get Ready'

font size 25 / position - screen center / font - times roman / font size 20 / time - 5 seconds
SCREEN - SEVEN
TEST SCREEN

screen size - display size / font size - 100 / font type - times new roman / font color - yellow / background color - blue / rectangle line - grey / rectangle fill - transparent / rectangle size - 25 x 35 mm / characters to be displayed - '4', '5', 'd', 'f' and 'blank' / order of presentation - random / each character is to be displayed 10 times for 60 - 70 - 80 - 90 - 100 - 110 - 120 - 130 - 140 - 150 milliseconds / one such presentation is called as a block / two such blocks to be presented / store trial no. - character displayed - time of display

SCREEN - EIGHT
RESPONSE SCREEN

Click on the rectangle that displayed the character that you saw

4  5  d  f

select this rectangle in case you saw '4' select this rectangle in case you saw '5' select this rectangle in case you saw 'd' select this rectangle in case you saw 'f'

Are you sure? YES / No

if yes go to feedback screen / if no repeat the response screen / store the response character - correctness
SCREEN - NINE
FEEDBACK SCREEN

Good / Sorry
The character displayed was ..........

verify the response / if correct print 'good' / if not print 'sorry' / display the actual character displayed along with rectangle

SCREEN - TEN
BLOCK ENDING SCREEN

Now let us have a break for a while, we shall begin whenever you are ready again for the second block

I am ready
Exit

font size 25 / position - screen center / when I am ready start a new file and repeat from get ready screen / else exit to discontinuation screen
Thank you so much for your participation and cooperation. We shall continue the experiment some other time.

---

Thank you so much for your participation and cooperation. This experiment is over now.
Experiment 2
Repetitive Response
SCREEN - ONE
Executable file for repeat program on desktop

SCREEN - TWO
WELCOME SCREEN

Hello! You are welcome to a computerised simulation of an experiment on response time. This experiment is part of Ph.D. research titled "A computational approach to cognitive and affective factors of multiple task performance", being done by Mr. Rashmin Sompura. I express heartily thanks to you for your participation in the research!!!

screen font color - yellow color
screen font size - 14
screen font type - times roman

Next
Exit
SCREEN - THREE
INFORMATION SCREEN

Kindly give me your following details:

First Name : 
Middle Name : 
Surname : 
Birth date : 
Age : 
Gender : 
Class : 
Date of experiment : 

screen size - active desktop
screen background - blue color
screen font color - yellow color
screen font size - 14
screen font type - times roman

should we put data check / above data should be repeated
against all the records / create a file name by first name

SCREEN - FOUR
INSTRUCTION SCREEN

Well, this is a very simple experiment. You just have to type a given key with a specified finger and hand as quickly as possible repetitively. For example, you might be asked to type digit 4 on numeric pad with the index finger of your right hand as quickly as possible repetitively, untill the screen displays message "STOP". In all we shall have following four combinations of key press, each to be done twice.
1. Type '4' with righthand index finger
2. Type '5' with righthand middle finger
3. Type 'f' with lefthand index finger
4. Type 'd' with lefthand middle finger

First you shall be show a screen saying "get ready for typing with your ...... finger of ........ hand. Afterwards within 1 minute you shall be given a signal to 'start'. As soon as you see 'start' immediately start typing the given letter with the specified finger and hand repetitively untill the screen shows 'stop'. Do you need any further clarification.

Yes
No

screen as screen three/if yes show next screen / if no repeat
instruction screen
SCREEN - FIVE
GET READY SCREEN

get ready to type
number '4' on numeric key pad with
index finger of your right hand

font size 25 / position - screen center / display start after
5 second

SCREEN - SIX
START SCREEN

Display start

font size 25 / position - screen center / start displaying the letters
typed by the 'P' / font size 14 / store time between 'start' signal and
first key press / find the difference as the response time / let
'start' be removed with the first letter typed / store time for end of
last key press and beginning of each key press / find the difference
and treat it as a response time / also store all the information screen
detail against each record / let the 'P' type 50 correct responses / in
case of incorrect responses continue upto 50 correct responses / stop
after 50th letter in the center / clear screen / display 'stop' / font
size 25 / position - screen center / consider all typing beyond 50 as
the extra typing until subject stops / may be displayed and saved on
the screen and file respectively / find average time of all the correct
response

fields : First Name / Middle Name / Surname / Birth date / Age /
Gender / Class / Date of experiment / Number typed / finger and
hand / trial no. / start time / end time / difference / correctness
/ average response time
SCREEN - SEVEN
FEEDBACK SCREEN

good! your average response time is ............... milliseconds

font size 25 / position - screen center /

SCREEN - EIGHT

Display repeat from screen 5 after 30 seconds
for 2, 3, and 4 combination and	hen again 1, 2, 3, 4 combination

What is the effect of computer specifications esp.

1. cpu and control cycle
2. ram
3. bus
4. hard disk seek time
5. monitor type and refresh rate
6. keyboard and typematic rate
7. any other
Thank you so much for your participation and cooperation. This experiment is over now.
Experiment - 3
Simple Reaction Time
SCREEN - ONE
Menu option for Experiment Three

SCREEN - TWO
WELCOME SCREEN

Hello! You are welcome to a computerised simulation of an experiment on response time. This experiment is part of Ph.D. research titled "A computational approach to cognitive and affective factors of multiple task performance", being done by Mr. Rashmin Sompura. I express heartily thanks to you for your participation in the research!!!

Next
Exit

screen size - active desktop
screen background - blue color
screen font color - yellow color
screen font size - 14
screen font type - times roman
SCREEN - THREE
INFORMATION SCREEN

Kindly give me your following details:

First Name :
Middle Name :
Surname :
Birth date :
Age :
Gender :
Class :
Date of experiment :

Next
Exit

screen size - active desktop
screen background - blue color
screen font color - yellow color
screen font size - 14
screen font type - times roman

put data check / above data should be repeated against all the
records / create a file name by first name

SCREEN - FOUR
INSTRUCTION SCREEN

Well, this is a very simple experiment. First you may set your righthand
index finger on the key '4' of numeric key pad. A screen shall be shown
asking you are you ready? Answer yes by pressing key 4 on the numeric
pad. Afterwards, you shall be shown a screen saying "ready" at the top
and a dot in the center of the screen. You are supposed to concentrate
on that dot. After about one second either letter '4' or blank screen
shall appear in place of the dot on the screen. If letter '4' appears
on the screen you shall immediately press '4' on the numeric pad.
Whereas, if blank screen appears you shall not press any key.

Remember, this is a test of your speed of response, i.e. try to be as
fast as possible in pressing key '4' whenever you see letter '4'
displayed on the screen. I want to know how fast you can respond after
seeing the letter '4'...faster the better.

Do you need any further clarification.

Yes
No

if yes show next screen / if no repeat instruction screen
SCREEN - FIVE
GET READY SCREEN

set your righthand index finger on numeric pad key '4'

ARE YOU READY ?

press '4' if yes
exit

font size 25 / position - screen center / if yes show next screen / if exit get out of the experiment

SCREEN - SIX
START SCREEN

Display a dot in the center

font size 25 / position - screen center / after 1 second the stimulus is displayed / font size as per 2 experiment / stimulus display time is 500 msec / store time for display and response both / find the difference as the response time / also store all the information screen detail against each record

Here there are four possibilities

<table>
<thead>
<tr>
<th>Stimulus display</th>
<th>response</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>blank screen</td>
<td>4 response</td>
</tr>
<tr>
<td>4</td>
<td>no response</td>
</tr>
<tr>
<td>blank screen</td>
<td>no response</td>
</tr>
</tbody>
</table>

in case of no response on part of the subject after 4 second go to the next screen

fields : First Name / Middle Name / Surname / Birth date / Age / Gender / Class / Date of experiment / stimulus displayed / display time / response time / difference of display and response / correctness
SCREEN - SEVEN
FEEDBACK SCREEN

good! your response time is ............milliseconds
or
it was a blank screen

font size 25 / position - screen center / go to next screen after 3 seconds

SCREEN - EIGHT
Repeat READY SCREEN

Get Ready!

exit

font size 25 / position - screen center / if exit get out of the experiment / show stimulus screen after 3 seconds
GO BACK TO SCREEN SIX / SEVEN / EIGHT upto end of the stimulus list

SCREEN - TEN

REPEAT SCREENS FROM SCREEN - FOUR TO SCREEN SEVEN FOR DIGIT 5, LETTER D AND LETTER F
Thank you so much for your participation and cooperation. This experiment is over now.
Experiment 4
Discrete Successive Choice
Reaction Time - Serial
This experiment is divided into three parts:
1. Discrete Successive Choice Reaction Time - Serial
2. Discrete Successive Choice Reaction Time - Reverse
3. Discrete Successive Choice Reaction Time - Alternate

screen size - active desktop
screen background - blue color
screen font color - yellow color
screen font size - 14
screen font type - times roman

Next
Exit
SCREEN - THREE
INFORMATION SCREEN

Kindly give me your following details:

First Name : 
Middle Name : 
Surname : 
Birth date : 
Age : 
Gender : 
Class : 
Date of experiment : 

screen size - active desktop
screen background - blue color
screen font color - yellow color
screen font size - 14
screen font type - times roman

put data check / above data should be repeated against all the records / create a file name by first name

SCREEN - FOUR
INSTRUCTION SCREEN - Serial

Well, this is a very simple experiment. First you may set your righthand index finger on the key '4' of numeric key pad and your right hand middle finger on the '5' of numeric key pad. A screen shall be shown asking you "are you ready?" Answer 'yes' by pressing key '4' on the numeric pad. Afterwards, you shall be shown a screen saying "ready" at the top and a dot in the center of the screen. You are supposed to concentrate on that dot. After about one second either a number '4' or a number '5' shall appear in place of the dot on the screen. If letter '4' appears on the screen you shall immediately press '4' on the numeric pad with your right hand index finger. Whereas, if '5' appears you shall press '5' on the numeric key pad with your right hand middle finger.

Remember, this is a test of your speed of response, i.e. try to be as fast as possible in pressing key '4' or '5' whenever you see number '4' or '5' displayed on the screen respectively. I want to know how fast you can respond after seeing the numbers '4' or '5'...faster the better.

Do you need any further clarification. 

Yes
No

if yes show next screen / if no repeat instruction screen
.SCREEN - FIVE
GET READY SCREEN

set your righthand index finger on numeric pad key '4'
and
set your righthand middle finger on numeric pad key '5'

ARE YOU READY?

press '4' if yes
exit

font size 25 / position - screen center / if yes show next screen / if exit get out of the experiment

SCREEN - SIX
START SCREEN

Display a dot in the center

font size 25 / position - screen center / after 1 second the stimulus is displayed (menu driven) / font size as per 2 experiment / stimulus display time is 500 msec (to be menu driven) / store time for display and response both / find the difference as the response time / also store all the information screen detail against each record

Here there are four possibilities

<table>
<thead>
<tr>
<th>Stimulus Display</th>
<th>Response</th>
<th>Correctness</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>4</td>
<td>right</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>wrong</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>right</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>wrong</td>
</tr>
<tr>
<td>all other responses</td>
<td></td>
<td>wrong</td>
</tr>
</tbody>
</table>

store right or wrong responses

fields: First Name / Middle Name / Surname / Birth date / Age / Gender / Class / Date of experiment / stimulus displayed / display time / response time / difference of display and response / correctness
SCREEN - SEVEN
FEEDBACK SCREEN

good! your response time is .............. milliseconds
and
your response was correct / wrong

font size 25 / position - screen center / go to next screen
after 3 seconds

---------------------------------------------------------

SCREEN - EIGHT
Repeat READY SCREEN

Get Ready!

exit

font size 25 / position - screen center / if exit get out of
the experiment / show stimulus screen after 3 seconds
SCREEN - NINE
STIMULUS SCREEN

GO BACK TO SCREEN SIX / SEVEN / EIGHT upto end of the stimulus list

SCREEN - TEN
INSTRUCTION SCREEN - Serial

Now we shall make a little change here. First you may set your lefthand index finger on the key 'f' of numeric key pad and your left hand middle finger on the 'd' of numeric key pad. A screen shall be shown asking you "are you ready?" Answer 'yes' by pressing key 'f' on the numeric pad. Afterwards, you shall be shown a screen saying "ready" at the top and a dot in the center of the screen. You are supposed to concentrate on that dot. After about one second either a letter 'f' or a letter 'd' shall appear in place of the dot on the screen. If letter 'f' appears on the screen you shall immediately press 'f' on the alphanuneric pad with your right hand index finger. Whereas, if 'd' appears you shall press 'd' on the alphanumeric key pad with your right hand middle finger.

Remember, this is a test of your speed of response, i.e. try to be as fast as possible in pressing key 'f' or 'd' whenever you see letters 'f' or 'd' displayed on the screen respectively. I want to know how fast you can respond after seeing the letters 'f' or 'd'...faster the better.

Do you need any further clarification.

Yes
No

if yes show next screen / if no repeat instruction screen
SCREEN - ELEVEN
GET READY SCREEN

set your lefthand index finger on numeric pad key 'f'
and
set your lefthand middle finger on numeric pad key 'd'

ARE YOU READY ?

press 'f' if yes
exit

font size 25 / position - screen center / if yes show next
screen / if exit get out of the experiment

SCREEN - TWELVE
START SCREEN

Display a dot in the center

font size 25 / position - screen center / after 1 second the stimulus
is displayed (menu driven) / font size as per 2 experiment / stimulus
display time is 500 msec (to be menu driven) / store time for display
and response both / find the difference as the response time / also
store all the information screen detail against each record

Here there are four possibilities

<table>
<thead>
<tr>
<th>Stimulus display</th>
<th>response</th>
<th>correctness</th>
</tr>
</thead>
<tbody>
<tr>
<td>f</td>
<td>f</td>
<td>right</td>
</tr>
<tr>
<td>f</td>
<td>d</td>
<td>wrong</td>
</tr>
<tr>
<td>d</td>
<td>d</td>
<td>right</td>
</tr>
<tr>
<td>d</td>
<td>f</td>
<td>wrong</td>
</tr>
<tr>
<td>all other responses</td>
<td></td>
<td>wrong</td>
</tr>
</tbody>
</table>

store right or wrong responses

fields : First Name / Middle Name / Surname / Birth date / Age / Gender / Class / Date of experiment / stimulus displayed / display time / response time / difference of display and response / correctness
SCREEN - THIRTEEN
FEEDBACK SCREEN

good! your response time is ............milliseconds
and
your response was correct / wrong

font size 25 / position - screen center / go to next screen after 3 seconds

SCREEN - FOURTEEN
Repeat READY SCREEN

Get Ready!

exit

font size 25 / position - screen center / if exit get out of the experiment / show stimulus screen after 3 seconds
SCREEN - FIFTEEN
STIMULUS SCREEN

GO BACK TO SCREEN SIX / SEVEN / EIGHT upto end of the stimulus list

SCREEN - SIXTEEN
INSTRUCTION SCREEN - Serial

Now we have one more change. First you may set your righthand index finger on the key '4' of numeric key pad and your right hand middle finger on the '5' of numeric key pad. Set your lefthand index finger on the key 'f' of alphanumeric keypad and your lefthand middle finger on the key 'd' alphanumeric keypad. A screen shall be shown asking you "are you ready?" Answer 'yes' by pressing key '4' on the numeric pad. Afterwards, you shall be shown a screen saying "ready" at the top and a dot in the center of the screen. You are supposed to concentrate on that dot. After about one second either a number '4' or a number '5' or letter 'f' or letter 'd' shall appear in place of the dot on the screen. If letter '4' appears on the screen you shall immediately press '4' on the numeric pad with your right hand index finger and if '5' appears you shall press '5' on the numeric key pad with your right hand middle finger. Whereas if letter 'f' appears on the screen you shall immediately press 'f' on the alphanumeric pad with your lefthand index finger and if 'd' appears you shall press 'd' on the alphanumeric key pad with your lefthand middle finger.

Remember, this is a test of your speed of response, i.e. try to be as fast as possible in pressing key '4', '5', 'f' or 'd' whenever you see number '4', '5', 'f' or 'd' displayed on the screen respectively. I want to know how fast you can respond after seeing the numbers '4' or '5', or letters 'f' or 'd'...faster the better.

Do you need any further clarification.

Yes
No

if yes show next screen / if no repeat instruction screen
set your righthand index finger on numeric pad key '4'
set your righthand middle finger on numeric pad key '5'
set your lefthand index finger on numeric pad key 'f'
set your lefthand middle finger on numeric pad key 'd'
ARE YOU READY ?

press '4' if yes
exit

font size 25 / position - screen center / if yes show next screen / if exit get out of the experiment

Display a dot in the center
font size 25 / position - screen center / after 1 second the stimulus is displayed (menu driven) / font size as per 2 experiment / stimulus display time is 500 msec (to be menu driven) / store time for display and response both / find the difference as the response time / also store all the information screen detail against each record
Here there are four possibilities

<table>
<thead>
<tr>
<th>Stimulus display</th>
<th>response</th>
<th>correctness</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>4</td>
<td>right</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>wrong</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>right</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>wrong</td>
</tr>
<tr>
<td>f</td>
<td>f</td>
<td>right</td>
</tr>
<tr>
<td>f</td>
<td>d</td>
<td>wrong</td>
</tr>
<tr>
<td>d</td>
<td>d</td>
<td>right</td>
</tr>
<tr>
<td>d</td>
<td>f</td>
<td>wrong</td>
</tr>
<tr>
<td>all other responses</td>
<td>wrong</td>
<td></td>
</tr>
</tbody>
</table>

store right or wrong responses
fields: First Name / Middle Name / Surname / Birth date / Age / Gender / Class / Date of experiment / stimulus displayed / display time / response time / difference of display and response / correctness
SCREEN - NINETEEN
FEEDBACK SCREEN

good! your response time is ..........milliseconds
and
your response was correct / wrong

font size 25 / position - screen center / go to next screen
after 3 seconds

SCREEN - TWENTY
Repeat READY SCREEN

Get Ready!

exit

font size 25 / position - screen center / if exit get out of
the experiment / show stimulus screen after 3 seconds
GO BACK TO SCREEN SIX / SEVEN / EIGHT upto end of the stimulus list

Thank you so much for your participation and cooperation. This experiment is over now.
Experiment 6
Matching Figures Test
Hello S! You are welcome to a computerised simulation of an experiment on response time. This experiment is part of Ph.D. research titled "A computational approach to cognitive and affective factors of multiple task performance", being done by Mr. Rashmin Sompura. I express heartily thanks to you for your participation in the research!!!

screen size - active desktop
screen background - blue color
screen font color - yellow color
screen font size - 14
screen font type - times roman
SCREEN - THREE
INFORMATION SCREEN

Kindly give me your following details:

First Name: 
Middle Name: 
Surname: 
Birth date: 
Age: 
Gender: 
Class: 
Date of experiment: 

screen size: active desktop
screen background: blue color
screen font color: yellow color
screen font size: 14
screen font type: times roman

Put data check / above data should be repeated against all the records / create a file name by first name

SCREEN - FOUR
INSTRUCTION SCREEN

Well, this is a very simple experiment. On following screens you shall be shown some exercises in matching figures that are exactly the same in size and shape. You shall be shown a problem figure on the left side of screen and a set of answer figures on right side of screen as shown below. Your task shall be to find out a figure among the set of answer figures which is exactly the same as problem figure in size and shape. You shall just 'click' that figure indicating right answer according to you. First we shall do 8 sample exercises and then we shall proceed for the real test.

Problem Figure | Answer Figure
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>□</td>
<td>□ □ □</td>
</tr>
<tr>
<td></td>
<td>□ □ △</td>
</tr>
</tbody>
</table>

Now get ready. Adjust mouse for your convenience to respond as quickly as possible.
SCREEN - FIVE
SAMPLE TEST SCREEN

1 x 8

font size 25 / position - screen center / if yes show next screen / if exit get out of the experiment

SCREEN - SIX
FEEDBACK SCREEN

If all correct:
Well done! Now get ready for the real test. Remember it is important to do right as well as to be quick. So try to be as quick as possible and also correct!! Press Next to start the test.

fields: First Name / Middle Name / Surname / Birth date / Age / Gender / Class / Date of experiment / stimulus displayed / display time / response time / difference of display and response / correctness
SCREEN - SEVEN
TEST SCREEN

15 \times 4 = 60

font size 25 / position - screen center / go to next screen after 3 seconds

SCREEN - EIGHT
THANKS SCREEN

Thank you so much for your participation and cooperation. This experiment is over now.

font size 25 / position - screen center / if exit get out of the experiment / show stimulus screen after 3 seconds
Experiment 7
Embedded Figures Test
Hello! You are welcome to a computarised simulation of an experiment on response time. This experiment is part of Ph.D. research titled "A computational approach to cognitive and affective factors of multiple task performance", being done by Mr. Rashmin Sompura. I express heartily thanks to you for your participation in the research!!!

Next
Exit

screen size  -  active desktop
screen background  -  blue color
screen font color  -  yellow color
screen font size  -  14
screen font type  -  times roman
SCREEN - SEVEN
TEST SCREEN

64

font size 25 / position - screen center / go to next screen after 3 seconds

SCREEN - EIGHT
THANKS SCREEN

Thank you so much for your participation and cooperation. This experiment is over now.

font size 25 / position - screen center / if exit get out of the experiment / show stimulus screen after 3 seconds