

Social Media or Meditation for Corsi-Blocks Performance

Introduction

The battle for one's attention has never been more prevalent in society than it is today. From social media draining us of our attention span and high jacking our short-term reward systems to meditation claiming to improve focused attention and improve long term rewards, these two arguably polar opposites are hot words on any person's palette. This sparks the curiosity for a series of experimental designs to put these two-arch nemesis in head to head battle for a series of attentional tests. This study forthright will examine the effects of meditation and social media on human cognitive performance with the classical Corsi-Blocks test. It is hypothesized that participants with a guided 3-minute meditation, when compared to participants exposed to 3-minutes of social media stimulus, will have higher Corsi-Block performance in the measure of more spans completed.

Previous research

Social media is known to reduce attention span and affect the reward systems in humans. This can be most greatly seen in the lack of ability of younger generations to maintain attention on stimuli that aren't described as 'exciting', 'captivating', or 'controversial'. This has become some well-known that it is normal conversations across almost all domains of society and especially, education, business, and family life. World health organizations have recognized social media to be an addiction, lead to depression and anxiety in youth, or depreciate connections with those around us while simultaneous creating more loneliness in individual's perception. Instagram is one of the largest social media platforms and has been chosen

accordingly as one of the stimuli in this study. These reasons have been spiking scientific research as well as the motive for this study.

Meditation is becoming exponentially more popular in western society and mindfulness is now a buzz word used from our most important moments in life to describing our mayonnaise. Despite this popularity, meditation comes in near countless forms and the scientific field still hasn't unified in defining what meditation truly is. Regardless of those barriers, meditation is generally known to be an effective attention trainer as well as provoking states of heightened cognitive abilities. The box breathing technique was chosen for this study because of previous literature supporting increases in attention, visual spatial perception, and working memory.

Methods

Participants

Seventeen participants were conveniently sampled through the experimenter's social network. The number of participants for these test were set on a fixed end date of 28/10/2022 in order to control for optional stopping. The stimulus choice was alternatingly distributed to participants resulting in nine social media participants and eight meditation participants. The demographics ranged from 18-60+, high school to masters educational background, current video game users, and childhood video game users.

Procedure

The procedure was to watch a computer screen with a board of ten blocks displayed. These blocks would randomly illuminate in a series. To start, two blocks illuminated to create the first series trial. Then the participant would click, or touch screen the blocks to repeat the order. If the participant selected correctly, the next series would begin with an additional illuminated

block in the series. This back and forth continued infinitely until the participant had two errors in a row. There was a time limit of 4 seconds on each trial, but participants didn't have any issues with time.

Design

This Corsi-Blocks experiment was designed and administered through NeuroTask Scripting. Display characteristics, color, block size, and block arrangement are the four primary visual parameters of the Corsi-Blocks task.

Ten blocks were used and arranged by the pattern¹ laid out in the appendix. The colors chosen were a white background with light grey blocks at opacity 0.7. Block size can be found in the appendix². Changing the block parameters was considered but given the issues of variations across Corsi-Blocks experiment¹, the arrangement was intentionally left the same as Dr. Jaap Murre's model in order to help unification across tests.

IV/DV

The independent variable was attention priming for 3-minutes with either meditation or social media. The meditation was a square breathing technique known to increase attention in forms of concentrations and performance². The social media was screen recorded from the experimenter's Instagram feed. The dependent variable was span completed on the Corsi-Block experiment. The design is a between subjects design, each participant is only receiving exposure to one of the two independent variables.

Statistical Analysis

Jasp was used to run a one-way pairwise t-test in order to see if meditation priming on attention produced a higher Corsi-Block span score than priming with social media exposure. An

alpha of 0.05 was sought to infer significance.

Testing for moderators/mediators will be conducted for age group, educational background, gender, current video game player, and childhood video game player.

Results

Paired Samples T-Test

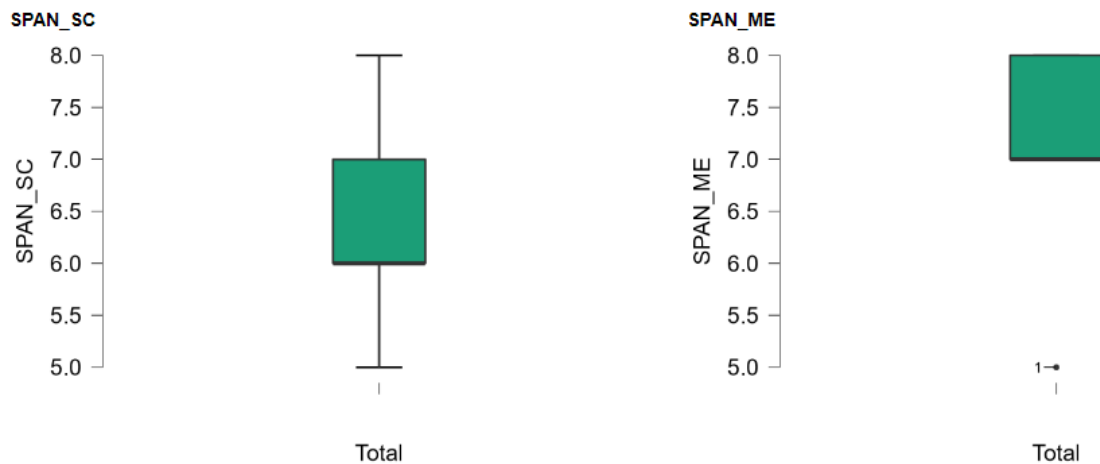
Paired Samples T-Test

Measure 1		Measure 2	t	df	p
SOC_SPAN	-	MED_SPAN	-1.528	7	0.085

Note. For all tests, the alternative hypothesis specifies that SOC_SPAN is less than MED_SPAN.

A one way paired samples t-test found $t(-1.53) = p > 0.085$ failing to reject the null hypothesis of social media being less effective than meditation for priming towards an increase in the Corsi-Blocks experiment.

Graphs: Boxplots



Visualizing the data via boxplot shows that variability is much higher in the Social Media stimuli and averaged a whole span number lower. Aside from the outlier in the meditation stimuli, it is shown that all results were high (seven or greater).

Discussion

The alpha value of 0.05 is known to be arbitrary and the null hypothesis significance testing method is known to have issues with the unreliability in creating hypothetical samples to compare the data collected and tested. The p-value of 0.085 is only 0.035 away from being a significant finding for example. This could have been done with a single more participant and if the researcher chose for optional stopping a significant p-value could of easily be found. This helps to support the needs for updated statistical testing such as Bayesian Statistics.

The highest score on the Corsi-Blocks test was eight and most scores were around six to seven. This brought interest to the general score for this test, and it is found to be around six. This suggests that on average, Social Media stimuli resulted in average scores, but the Meditation stimuli resulted in high scores. This suggests that the meditation stimuli were significant in improving attentional ability, despite what the p-value reported.

Participants did report that overall, there was an additional improved emotional affect from the meditation experience and they were glad they did not receive the social media stimulus. This meta-awareness of the effects of both stimuli is fascinating given the popularity and immediacy to turn to social media rather than mediation whenever we have a short amount of free time on our hands. A very different world could be ushered in if there was a collective sociological push for shifting our social media habits to more attention improving habits such as mediation.

Limitations

The researcher did not gather data on average reported scores until after visualizing the data and luckily becoming curious then. Without this luck, the researcher may have missed this arguably significant result. This serves as a learning experience to seek for average scores on tests that have been used before even if the experiment will include new variations.

The social media priming experience was less than optimal because participants were exposed to a social media experience curator by the experimenter rather than their individual social media algorithms. Their own algorithms are more attuned to their personal neurological conditioning and will likely produce a greater shortage of attention. To overcome this limitation, it is recommended designing a way for participants to access their own social media account for a timed duration, likely by monitoring them with an experiment technician.

Box breathing was the chosen mediation priming for this experiment but other meditations, such as point focus, might be more effective at producing higher attentional ability.

There were a few reported errors with the touchscreen versions of the experiment. The initial touched block would remain selected for the entire selection period and result in an error reported for that span. This is likely due to an await function tied to the 'touchscreen' illumination of a selected block as this only persists surrounding the 'touchstart' command and not the 'click' (mouse) command. Overcoming this limitation can be addressed by modifying the NeuroTask Scripting code and outsourced contact to the program developer has been made.

In conclusion, meditation and social media aren't the ultimate answers or problems to our attention spans. They both have ways of affecting our cognitive abilities and the science is developing further daily. This study has shown a likely possibility for meditation helping to

improve attention, but the evidence needs to be stronger, and it is recommended to reference more extensive studies if looking to further support to this claim.

Appendix

1. Neurotask block arrangement: [[10,10],[20,40],[20,80],[40,30],[45,60],[60,10],[60,75],[70,50],[80,20],[85,45]]
2. left+width-9,top+height-7,7,5

Changes to original Script

Implemented a demographic questionnaire. Two visual stimuli that alternate between participants. Translation and modification of Dutch instructions into English.

Red star background click changed to blue star. Time between each block flash has been shortened. Instructions have been translated and rewritten in my verbiage. 'touchstart' response added to allow for users to test on phones.

Convenience sample

Script used to gain participants: Here's my last experiment for the semester. It's a fun memory game again but a very different style than the last two. PLEASE USE A COMPUTER, sorry but there is a weird error I can't yet fix with touchscreens.

Thank you for all the support!

<http://scripting.neurotask.com/exp/CbxHyJtXNF>

Work Cited Page

1. The Corsi Block-Tapping Task: Methodological and Theoretical Considerations

https://www.researchgate.net/profile/Robert-Krikorian/publication/13445486_The_Corsi_Block-Tapping_Task_Methodological_and_Theoretical_Considerations/links/5a32982f0f7e9b2a2847d7cb/The-Corsi-Block-Tapping-Task-Methodological-and-Theoretical-Considerations.pdf

2. Effect of Box Breathing Technique on Lung Function Test

<http://eprints.asianrepository.com/id/eprint/1085/1/34085-Article%20Text-61425-1-10-20211225.pdf>

3. Myth and Mystery of Shrinking Attention Span <http://www.ijtrd.com/papers/IJTRD16531.pdf>

4. Use of multiple social media platforms and symptoms of depression and anxiety: A nationally-representative study among U.S. young adults

https://www.sciencedirect.com/science/article/abs/pii/S0747563216307543?casa_token=d63K2XnltBkAAAAA:NOO5bzVjgAsezg7T-Z2dgem-Z2uF_E0QP-I3QTwPIprCCKzMLsZbdIa3LHo6tqGtZF4jnh7BmJ8

5. Reviewing social media use by clinicians

<https://academic.oup.com/jamia/article/19/5/777/2909184>

6. Corsi task

[https://www.psychtoolkit.org/experiment-library/corsi.html#:~:text=The%20normal%20\(average\)%20score%20is,that%20will%20be%20quite%20rare.](https://www.psychtoolkit.org/experiment-library/corsi.html#:~:text=The%20normal%20(average)%20score%20is,that%20will%20be%20quite%20rare.)

7. Mediation and Moderation Analysis in JASP

<https://jasp-stats.org/2020/03/12/mediation-and-moderation-analysis-in-jasp/>

NeuroTask Script

```
main.setFontsize(60);
instruction("Welcome to the Austin Lokey's Corsi Blocks experiment","OK"," ");

// Questionnaire
instruction("To begin, we'll start with a few basic demographic questions. Additionally, by
selecting 'ok' you consent to this experiment. Please keep in mind that you can leave the
experiment if it feels harmful to you.");

select("What's your age",
      [['10-18'], ['18-23'], ['24-30'], ['30-60'], ['60-200']], "age");
select("Educational background",
      [['elementary'], ['middle school'], ['high school'], ['some college'], ['BA/BS'], ['MA/MS'],
['Ph.D/Psy.D']], "education");
select("Do you play video games?",
      [['yes', 1], ['no', 0]], "video_game_present");
select("Did you play video games growing up at least 3-5 times a week?",
      [['yes', 1], ['no', 0]], "video_game_youth");
select("How do you identify sex/gender",
      [['female', 1], ['male', 0], ['other', 3]], "gender");

instruction('A video will begin after selecting "ok". Please watch the video and follow
instructions if there are any.');
```

```
// Create options for my video so participants can't skip and it autoplays
var video_options = {
  autoplay: true
},
advanced_options = {
  clickToPlayPause: false,
  features: ['volume', 'fullscreen'],
  enableKeyboard: false
};

// Alternates between meditation and social media stimulus

// , video_options, advanced_options *add these into script after data collection*

var n = increase("subject_id","script");
console.log("Subject ID",n);
if (n%2 === 0)
{
  setvideo('https://www.youtube.com/watch?v=bF_1ZiFta-E');
```

```

        await('videoended');
    } else {
        setvideo('https://youtu.be/NCqrTkhFjAI');
        await('videoended');
    }

select("Which video did you watch?",
    [['meditation', 1], ['social media', 0]], "video type");

// Corsi Code begins

var coords = [[10,10],[20,40],[20,80],[40,30],[45,60], // block coordinates in %
    [60,10],[60,75],[70,50],[80,20],[85,45]]; // [[left,top], ...]
// Blocks 0 to 9

// The following will be the illumination pattern of the blocks

var stimuli_corsibasics = [
    [[], [] ],
    [[1], [1] ],
    [[9,7], [6,3] ],
    [[5,8,0], [6,9,4] ],
    [[7,2,8,6], [6,0,3,9] ],
    [[4,2,0,3,1], [7,5,8,3,0] ],
    [[3,9,2,4,8,7], [6,1,9,4,7,3] ],
    [[4,1,7,9,3,0,6], [6,9,1,7,4,2,8] ],
    [[3,8,2,9,6,1,7,4], [5,0,1,3,2,6,4,7] ],
    [[2,7,0,8,6,3,1,9,4],[7,1,3,9,4,2,5,6,8] ]
];

function shortalert(message,ms_ok,left,top,width,height,color)
{
    ms_ok = ms_ok || 1000;
    left = left || 30;
    top = top || 20;
    width = width || 40;
    height = height || 20;
    color = color || '#f5f5dc';

    var b = addblock(left,top,width,height,color,message);

    if ($.type(ms_ok) === 'number')
    {
        await(ms_ok);
    }

```

```

    }
    else
    {
        var b_ok = addblock(left+width-9,top+height-7,7,5,'lightgrey',ms_ok);
        b_ok.style('font-size','70%')
        .style('border','solid #a9a9a9 thin')
        .style('cursor','pointer')
        .style('opacity','0.7');
        b_ok.await('click, touchstart');
        b_ok.destroy();
    }

    b.destroy();
}

```

// This creates a blue star when clicking on something other than a block

```

function show_flash(e)
{
    var x = addblock(e.event.layerX*100/e.event.target.clientWidth - 2.5,
        e.event.layerY*100/e.event.target.clientHeight - 2.5,
        5,5)
        .style('color','blue')
        .icon('star');
    await(150);
    x.destroy();
}

```

// What does this do?

```

function show_start()
{
    main.style('background-color','beige');
    await(250);
    main.style('background-color','white');
}

```

// shows the blinks for the blocks in the corsi test

```

function show_blinks(series,blocks,block_color)
{
    var i, b, b_start;

    for (i = 0; i < series.length; i++)          // 'Play' series
    {
        b = series[i]; // [2,5,...] i = 0 -> b = 2
        blocks[b].style("background-color","black");
        await(300);
        blocks[b].style("background-color",block_color);
        await(300);
    }

    show_start();
}

function corsibasics_example()
{
    main.setfontsize(60);

    var blocks = [], i, b, series, e, block,
        block_color = "lightgrey",
        span = 2, errors, attempts = 0, correct = 0, total_correct = 0,
        kessels_score;

    instruction('A field of blocks will be your battle ground for the next tests.'
+ ' After they illuminate, you are to click on the series of blocks in the same order.'
+ ' You will see different patterns. After two correct the number of lit blocks in the pattern will
increase.'
+ ' The experiment will run until you make two errors. Then it will end and give you your score
(:,'OK', 'Instruction');

    instruction("You'll start with an example so you can practice.", "OK", " ");
    instruction("After each pattern there is a short beige flash of the background. Then you can
click on the blocks in the same order.", 'OK', ' ');

    for (i = 0; i < coords.length; i++) // Create block layout, use `i` as id
    {
        blocks.push(addblock(coords[i][0],coords[i][1],10,10,block_color,"i));
    }

    await(700);
    series = [3,6];

```

```

show_blinks(series,blocks,block_color);

errors = 0;
for (i = 0; i < 2; i++)      // Have subject click series
{
    e = await("click, touchstart",4000);      // Event `e` also contains target node
    if (e.type !== 'timeout')
    {
        b = parseInt(e.event.target.id); // parseInt turns a string into a number or NaN on
        strange behavior (drag or click anywhere)

        if (e.event.target.id === 'undefined' || isNaN(b))
        {
            show_flash(e);
            i--;
            continue;
        }

        blocks[b].blink("black",150);    // 150 ms blink to black
        if (series[i] !== b)              // Count errors
        {
            ++errors;
            console.log("Error? ",i,series,series[i],b);
        }

        console.log(series[i],b,errors)
    }
    else
    {
        alert("Timed out, please respond faster. We'll start again.");
        await(1000);
        show_blinks(series,blocks,block_color);
        i = -1;
        errors = 0;
        continue;
    }
}

await(500);

if (errors > 0)
{
    alert("Make sure you click on the blocks in the same order as shown.");
}

```

```

else
{
    shortalert('Correct!',null,null,null,25,15);
}

await(1000);
series = [4,2,9];

show_blinks(series,blocks,block_color);

errors = 0;
for (i = 0; i < 3; i++)          // Have subject click series
{
    e = await("click, touchstart",2000);          // Event `e` also contains target node
    if (e.type !== 'timeout')
    {
        b = parseInt(e.event.target.id); // parseInt turns a string into a number or NaN on
strange behavior (drag or click anywhere)

        if (e.event.target.id === 'undefined' || isNaN(b))
        {
            show_flash(e);
            i--;
            continue;
        }

        blocks[b].blink("black",150); // 150 ms blink to black
        if (series[i] !== b)          // Count errors
        {
            ++errors;
        }
    }
}

await(500);

if (e.type === 'timeout')
{
    alert("Timed out, please respond faster.");
}
else if (errors > 0)
{
    alert("Make sure you click on the blocks in the same order as just shown.");
}

```

```

else if (errors === 0)
{
    shortalert('Correct!',null,null,null,25,15);
}

await(2000);

for (i = 0; i < blocks.length; i++) // Create block layout, use `i` as id
{
    blocks[i].destroy();
}
blocks = [];

log(total_correct,"total_correct_corsibasics_example");
}

function corsibasics()
{
    main.setfontsize(60);

    var blocks = [], i, b, series, e, block,
        block_color = "lightgrey",
        span = 2, errors, attempts = 0, correct = 0, total_correct = 0,
        kessels_score;

    for (i = 0; i < coords.length; i++) // Create block layout, use `i` as id
    {
        blocks.push(addblock(coords[i][0],coords[i][1],10,10,block_color,"i));
    }

    while (true) // Do 'forever', but really only until `break` is called
    {
        await(2000);
        series = stimuli_corsibasics[span][attempts];

        // series = [2,5,1,7,8, ...]
        show_blinks(series,blocks,block_color);

        errors = 0;
        for (i = 0; i < span; i++) // Have subject click series
        {
            e = await("click, touchstart"); // Event `e` also contains target node
            b = parseInt(e.event.target.id); // parseInt turns a string into a number or NaN on
            // strange behavior (drag or click anywhere)

```

```

if (e.event.target.id === 'undefined' || isNaN(b))
{
    show_flash(e);
    i--;
    continue;
}

blocks[b].blink("black",150);    // 150 ms blink to black
if (series[i] !== b)            // Count errors
{
    ++errors;
}
}

++attempts;
if (errors === 0)
{
    ++correct;
    ++total_correct
    if (attempts === 2)          // If twice correct, increase span
    {
        ++span;
        attempts = 0;
        correct = 0;
    }
}
else if (errors > 0)
{
    if (attempts === 2)          // If twice wrong, stop test
    {
        if (correct === 0)
        {
            --span;
            kessels_score = span*total_correct; // Kessels et al. (2000)
            break;                // Break out of while loop
        }
        else
        {
            ++span;
            attempts = 0;
            correct = 0;
        }
    }
}
}

```

```

    }
}

for (i = 0; i < blocks.length; i++) // Create block layout, use `i` as id
{
    blocks[i].destroy();
}
blocks = [];

response.span = span;

console.log("Corsi Span: ",span,"");

log(total_correct,"total_correct_corsibasics");
log(span,"span_corsibasics");
}

//An opportunity for feedback and praise (:

corsibasics_example();
instruction("Now comes the actual test. You will no longer receive feedback.", "OK", " ");
corsibasics();
instruction("Your best correct series was {span} blocks. <br /><br />Thank you for
participating!", "OK", " ");

input("Would you like to give any feedback?");
input("Optional to leave your name and I can give you your score easier (: If you'd rather remain
anonymous just leave this blank.");
instruction("This concludes the experiment. Thank you for contributing your brain to science.
You may close this window and resume rocking out to life.");

```