### QUANTITATIVE RESEARCH | CHEAT SHEET

#### PREREQUISITES
- Write clear research questions, order them by priority and importance, and write them out in full.

#### DESIGN AND ANALYSIS
- Design is more important than analysis.
- Before collecting data, ensure that your analysis matches your design, and vice versa.
- Obtaining more data is always better, no matter what.
- Check whether your proposed study is **LAX**, **PERMISSIVE**, **LIBERAL** in each row of the table on the right. For explanation, see notes.
- If your study has at most **TWO orange cells** and no **RED cell** in the table on the right, then proceed with caution. If your study has more than two orange cells or one red cell, go back and reconsider your design and analysis.
- Beware of order effects (priming, learning, emerging strategies, fatigue, boredom, etc.) within a participant’s session and across multiple sessions for the same participant. Test for these effects in your analyses.
- Check ALL assumptions of a statistical test or model BEFORE conducting that test or fitting that model.

#### REFERENCES

#### ACKNOWLEDGEMENTS
Thanks to Maaike Schoorlemmer, Kirsten Schutter and Piet van Tuyl for helpful comments and suggestions.

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### CHEAT SHEET

<table>
<thead>
<tr>
<th>1. No prior evidence against H0 (significant outcome may be false positive)</th>
<th>2. Key factors vary between participants</th>
<th>3. Large variation between participants (items)</th>
<th>4. Exploratory research, developing tentative ideas</th>
<th>5. Few participants OR few items</th>
<th>6. Low power</th>
<th>7. Dependent variable (response) measured on categorical scale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LAX, PERMISSIVE, LIBERAL</strong></td>
<td><strong>STRICT, RESTRICTIVE, CONSERVATIVE</strong></td>
<td><strong>NOTES</strong></td>
<td><strong>MY STUDY IS...</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strong prior evidence against H0 (significant outcome may be true positive)</td>
<td>Key factors vary within participants</td>
<td>Small variation between participants (items)</td>
<td>Experimental research, testing pre-existing hypothesis</td>
<td>Many participants AND many items</td>
<td>High power</td>
<td>Dependent variable (response) measured on continuous scale</td>
</tr>
</tbody>
</table>

**CRITIQUE:**

- If most of H0’s (!) being tested are true, a priori, then most of significant outcomes are false positives (Ioannidis, 2005). See point 4.
- Larger variation requires larger numbers of participants (items), see point 5. Consider (i.e. balance) both internal and external validity.
- Related to point 5. “categorical” or qualitative response: e.g. correct–incorrect response, scale with 5 or fewer options; “continuous” or numerical response: e.g. response time in ms, scale with 7 or more options, most phonetic measurements.

**SAFETY:**

- NB “few” means 12 or fewer, “many” means 30 or more participants AND items.
- NB “low” means .8 or less, “high” means .9 or more.
- Related to point 5.

**TREATMENT VARIES BETWEEN PARTICIPANTS**

<table>
<thead>
<tr>
<th>TREATMENT VARIATION BETWEEN PARTICIPANTS</th>
<th>Treat.A</th>
<th>Treat.B</th>
</tr>
</thead>
<tbody>
<tr>
<td>groups 1+2 (each n=32)</td>
<td>1.A</td>
<td>2.B</td>
</tr>
<tr>
<td>groups 3+4 (each n=32)</td>
<td>3.A</td>
<td>4.B</td>
</tr>
<tr>
<td>total N=128 participants</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TREATMENT VARIES WITHIN PARTICIPANTS**

<table>
<thead>
<tr>
<th>TREATMENT VARIATION WITHIN PARTICIPANTS</th>
<th>Treat.A</th>
<th>Treat.B</th>
</tr>
</thead>
<tbody>
<tr>
<td>group 1 (n=48)</td>
<td>1.A</td>
<td>1.B</td>
</tr>
<tr>
<td>group 2 (n=48)</td>
<td>2.A</td>
<td>2.B</td>
</tr>
<tr>
<td>total N=96 participants</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**THE FOLLOWING TWO TABLES ILLUSTRATE ROW 2 OF THE TABLE ABOVE.**

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</tr>
<tr>
<td>total N=128 participants</td>
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**THANKS TO MAAIKE SCHOORELMER, KIRSTEN SCHUTTER AND PIET VAN TUYL FOR HELPFUL COMMENTS AND SUGGESTIONS.**

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**REFERENCES**