

# Platitudes for research design and analysis

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Adapted from Thomas D. Wickens

## **There is an answer.**

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*The goal is often to understand the question.*

## **Keep things simple.**

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*Simpler procedures are usually better – especially with respect to statistics – and are easier to communicate.*

## **Understand what you're looking for.**

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*Don't carry baggage that you don't need. Think about where the variability is likely to occur. For example, if interactions are not of interest, then two one-way designs may be a better option than a two-way design.*

## **Have clear questions.**

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*Define what you're looking for specifically and clearly – or all of the data in the world won't answer your questions. The questions should dictate the design – not the other way around. There are three levels of questions:*

1. Three to four specific questions that will come out of the study –  
Is  $A > B$ ? Does A correlate with B?
2. Slightly broader questions –  
Relations, etc. that you want to examine
3. Data-drive, post-hoc questions –  
See if the data tell or suggest anything else

## **You get out of an analysis what you put into it.**

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*The more you are willing to assume about the data, the more the data can tell you. Assumptions are always required, but they may limit generalizability.*

## **Live with your data**

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*You need to 'wallow' in the data to get a feel for it. Enter the data – graph it in various ways, and so forth.*

*The data may suggest things post-hoc; they may suggest ways to improve the study.*

*Explain your data to some poor slob – preparing a presentation is often a good way to notice things about your data – both problematic and fortuitous.*

## **Don't expect miracles**

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*Data analysis cannot do many things. There are limits on what data analysis or experiments can show. There is always variability, so there will be some fuzziness. Thoughtful design will identify areas of high-variability and low-power so that you can compensate in the design before running the study.*

*Use common sense. Don't expect statistics to fix things after you've run the experiment. Statistical fixes (such as transformations) are dangerous because they add assumptions (e.g., linearity) and create problems with reporting.*

*Before conducting the research, test your research design like software. Try to break it. Find faults with it. Ask others to do the same. Then try to fix the problems at the design stage rather than at the analysis stage.*