INTRO TO PL2131

Learn how to conduct psychological research

- Turning a question into research
- Designing an experiment
- Collecting and analysing data
- Presenting findings

SCIENTIFIC RESEARCH – the scientific approach

1) Intuition: process of coming to direct knowledge or certainty without reasoning or inferring; forming hypotheses

2) Authority: acceptance of facts stated by authorities; used in designing stage; expert whose facts are subject to testing using the scientific process

3) Rationalism: uses reasoning to arrive at knowledge, assumes that valid knowledge is acquired if correct reasoning process is used; identify the outcomes that indicate the truth/falsity of the hypotheses

4) Empiricism: acquire knowledge through experiences; cognition and perception; empirical observations to be conducted under controlled conditions

- The goal of science: to understand the world we live in
- To acquire knowledge

ASSUMPTIONS UNDERLYING SCIENTIFIC RESEARCH

2) Reality in nature: our experiences are real; forms basis for further research; scientists assume that there is an underlying reality that they are trying to uncover

3) Discoverability: it is possible to discover the regularities and reality; must assume that we can discover laws that make experiences real

1) Uniformity/regularity in nature

a. Determinism: the belief that there are causes or determinants of mental processes and behaviour (making sense of the world)
b. Probabilistic cause: causes that usually produce outcomes, the interim and what we get instead when we are seeking to attain the end goal that is determinism

PSYCHOLOGICAL RESEARCH

Conceptualisation	adopting a scientific approach; definition of terms
Operationalisation	construct vs measure; working definition of the construct - specification
Hypothesis	forming a testable hypothesis; science is falsifiable; embracing the null; can never be proven to be correct

PSYCHOLOGICAL RESEARCH (cont)

Research study	experimental vs non-experimental
Data collection	how do we treat subjects? measurement modes used
Data analysis	samples and sample sizes; comparing group scores
Presentation	presenting research findings

MEASUREMENT MODES

Nominal	categories, non-quantitative, uses symbols to classify variable values
Ordinal	rank-order scale of measurement; cannot assume equidistance
Interval	equal intervals, no absolute zero point (arbitrary)
Ratio	absolute zero point, rank-ordering, equal intervals

GOOD MEASUREMENTS
- Reliability: consistency of scores of your measurement instrument
- Validity: extent to which your measurement procedure is measuring what you think it is measuring; whether you have used and interpreted the scores correctly

EXPERIMENTAL RESEARCH

Quant. exp. research designs	Conducting experiments to establish causations by manipulating IVs and observing changes on DVs

Required conditions for claiming causation:
- Association: 2 variables are empirically correlated
- Temporality: cause comes before effect
- Elimination of plausible alternative explanations: effect cannot be explained by a 3rd variable

INDEPENDENT VARIABLES

Levels of the IV and manipulation strength	>2 levels of the IV to conclude causality	Strength: levels of the IV must be distinct and different from each other

INDEPENDENT VARIABLES (cont)

# of IVs?	>1 IV!!	Having only one -> misleading

In experimental designs:
- Event manipulation: random assign. into conditions, roughly equal profiles
- Instructional manipulation
- Individual difference manipulation: varying IV by selecting participants that differ in the amt or type of a measured internal state (cannot conclude causality; inherent characteristics)

DEPENDENT VARIABLES

In experimental designs	They can be continuous or categorical in nature
Number of DVs	There can be alternatives! -> accuracy/response time

EXTRANEOUS VARIABLES

In experimental designs

- Third variables besides the IV and DV
- Cloud interpretations of the IV-DV rship if uncontrolled
- Blinding to remove bias (systematic ways to account for them)

EV vs CV

EV	CV
- Might compete with the IV in explaining the outcome	- An EV that may eliminate the ability to claim that the IV causes changes in the DV
- Affects absolute outcome but not experimental outcome	- Creeps in systematically and affects one level of the IV but not the other

DESIGNS

Between (goes through 1 level of the IV)	Within (goes through all levels of the IV)
Shorter time to obtain results	Elimination of CVs
Random assign. could cause unequal groups of unequal abilities (confounding)	Mental fatigue, floor effects

EXPERIMENTAL CONTROL

Between	Within: counter-balancing to counter sequencing effects (order effects and carryover effects)
- matching: alt. method to/can be combined with randomisation	- randomised: possibility that there is a sequence that has a higher frequency of a certain variable
- randomisation	- intrasubject: does not solve order effects
	- complete: N!, N = # of levels of IV; may not have enough participants
	- incomplete: multiple sequences, control order effects, N sequences, only works for even #; odd # – create a mirror!

Matching:
o Equating participants
 Precision-control: each participant matched with another on selected variables (equal identical attributes);
 Freq. distribution: match groups by equating overall distribution of selected variable – random assign til 2 groups comparable
o Hold variables constant: slicing
o Build the EV into research design

Incomplete:
 Each TC appear equal no. of times in each position
 Each TC precede and follow every other TC equal no. of times

NON-EXPERIMENTAL RESEARCH

Experimental	Non-experimental
manipulated the IV (variability)	did not manipulate the IV (variability due to individual differences
can infer causality	can only infer correlation
control over EVs	construct and use good test items

SURVEY RESEARCH METHODS

1. Match the research objectives.
2. Appropriate for the respondents to be surveyed.
3. Short, simple questions.
4. Avoid loaded or leading questions
5. Avoid double-barrelled questions
6. Avoid double negatives
7. Determine whether closed-ended, or open-ended, or mixed format questions are needed
8. Construct mutually exclusive and exhaustive response categories for closed-ended questions
9. Consider the different types of closed-ended response categories (measurement modes) – would an interval scale or ordinal scale be more useful?
10. Use multiple items to measure complex or abstract constructs
11. Make sure questionnaire is easy to use; - Limit contingency questions (redirection) - Control response bias (social desirability) - Control response bias (response set) – insert contrasting items
12. Pilot-test – think-aloud technique

Need to ensure the validity of questionnaire (i.e., the test items measure what we had initially set out to measure)
Construct is too broad for comfort: need to operationalize
Specific operationalization of the idea that we want to pursue and not something else

DESCRIBING SCORES

Mean	Variability
	- Wanting to know how the scores spread around the mean
- Presence of outliers can be misleading	Standard deviation: describing the spread of a group of scores; average amount that scores differ from the mean
	Variance

Central tendency:
- Make sense of a group of scores
- Know how our data look like centrally

INFERENTIAL STATISTICS

1. Converting raw scores to Z-scores	2. Converting Z-scores to raw scores
- Number of SDs a score is above or below the mean	X=(Z)(SD)+M

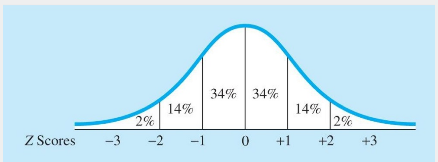
INFERENTIAL STATISTICS (cont)

Z=(X-M)/SD	Distribution of Z-scores: M=1,SD=1

Z-scores
- To describe a score in terms of where it fits into the overall group of scores, create a Z-score
- Number of SDs a score is above or below the mean
- Analogous to a translation; standardisation

!! We describe a group of data scores using a representative value (mean + SD)
Obtain a Z-score to infer how a score is ‘performing’ in comparison to others.

NORMAL CURVE



NORMAL CURVE

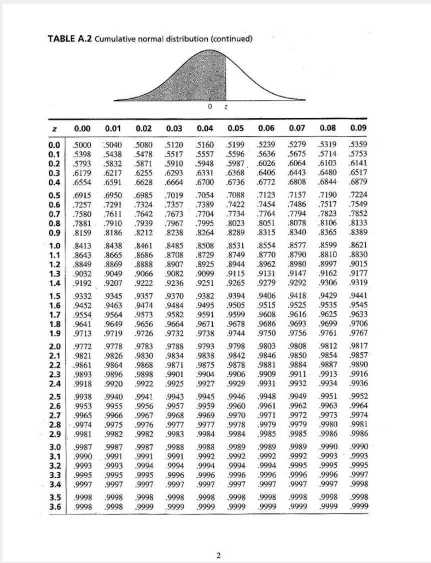


TABLE A.2 Cumulative normal distribution (continued)

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998
3.5	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998
3.6	.9998	.9998	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999

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EFFECTS

Ceiling effect	when an IV no longer has an effect on the DV
Floor effect	when a data-gathering instrument has a lower limit to the data values it can reliably specify