Results and Discussion Chapters for Quantitative Research



MASSEY UNIVERSITY

National Centre for Teaching & Learning

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Contents

Introductions

- Acknowledgements
- **Results structure**
- Tables and figures
- Results style
- **Discussion structure**
- Discussion style
- Resources









Introductions





Discuss in pairs or small groups for 15 minutes

- What writing have you done over the last month?
- What kind of quantitative data / analysis will you have in your thesis?
- How will you present this data / analysis?
- What challenges do you face in commenting on your data?
- What advice and / or resources have you found helpful in writing about your data / analysis?







Acknowledgements



This presentation refers to four Massey doctoral theses:

- Rosemary Gibson (2014) Understanding and Managing Dementia-Related Sleep Problems: Community-Based Research with Older New Zealanders. <u>http://hdl.handle.net/10179/6688</u>
- Lisanne Fermin (2017) Pre-implantation maternal uterine effects on embryo growth and development: An investigation using models of maternal constraint in sheep. <u>http://hdl.handle.net/10179/4793</u>
- Hwee Ming Teo (2016) Development of novel nanoemulsions as delivery systems. <u>http://hdl.handle.net/10179/9903</u>
- Nirosha Priyadarshani (2017) Wavelet-based birdsong recognition for conservation. <u>http://hdl.handle.net/10179/12127</u>

Dean's award list for exceptional theses: tinyurl.com/masseydeanslist

We also refer to this useful online resource:

MANCHESTER 1824

Academic Phrasebank

The University of Manchester

Introducing Work	Referring to Sources	Describing Methods	Reporting Results	Discussing Findings	Writing Conclusions

Home Page

GENERAL LANGUAGE FUNCTIONS

Being Cautious

Being Critical

Classifying and Listing

Compare and Contrast

Defining Terms

Describing Trends

Describing Quantities

Explaining Causality

Giving Examples

Signalling Transition

Writing about the Past

ABOUT PHRASEBANK

The Academic Phrasebank is a general resource for academic writers. It aims to provide you with examples of some of the phraseological 'nuts and bolts' of writing organised according to the main sections of a research paper or dissertation (see the top menu). Other phrases are listed under the more general communicative functions of academic writing (see the menu on the left). The resource should be particularly useful for writers who need to report their research work. The phrases, and the headings under which they are listed, can be used simply to assist you in thinking about the content and organisation of your own writing, or the phrases can be incorporated into your writing where this is appropriate. In most cases, a certain amount of creativity and adaptation will be necessary when a phrase is used. The items in the Academic Phrasebank are mostly content neutral and generic in nature; in using them, therefore, you are not stealing other people's ideas and this does not constitute plagiarism. For some of the entries, specific content words have been included for illustrative purposes, and these should be substituted when the phrases are used. The resource was designed primarily for academic and scientific writers who are non-native speakers of English. However, native speaker writers may still find much of the material helpful. In fact, recent data suggest that the majority of users are native speakers of English. More about Academic Phrasebank.

This site was created by **John Morley**. If you could spare just two or three minutes of your time, I would be extremely grateful for any feedback on Academic Phrasebank: Please click **here** to access a very short questionnaire. Thank you.

phrasebank.manchester.ac.uk

Reporting Results



Providing background information: reference to the literature

Providing background information: reference to the question

Restating the result or one of several results

Indicating an unexpected outcome

Comparing the result: supporting previous findings

Comparing the result: contradicting previous findings

Offering an explanation for the findings

Advising cautious interpretation of the findings

Suggesting general hypotheses

Noting implications of the findings

Commenting on the findings

Giving suggestions for future work

Stating a positive result - close

The mean score for X was ... Further analysis showed that ... Further statistical tests revealed ... A two-way ANOVA revealed that ... On average, Xs were shown to have ... Strong evidence of X was found when ... This result is significant at the p = 0.05 level. The results, as shown in Table 1, indicate that ... A positive correlation was found between X and Y. There was a significant positive correlation between ... The difference between the X and Y groups was significant. There was a significant difference in X, t(11) = 2.906, p < 0.01There was a significant difference between the two conditions ... Respondents who reported low levels of X also reported significantly lower levels of Y.

Stating a negative result - close

No increase in X was detected. No difference greater than X was observed. No significant differences were found between ... None of these differences were statistically significant. No significant difference between the two groups was evident. No significant reduction in X was found compared with placebo. No evidence was found for non-linear associations between X and Y. No significant correlation was found between X scores and the Y scores (p = .274) X appeared to be unaffected by Y. Only trace amounts of X were detected in ...

There was no evidence that X has an influence on ... The Chi-square test did not show any significant differences between ... Overall, X did not affect males and females differently in these measures. A clear benefit of X in the prevention of Y could not be identified in this analysis.

T-tests found no significant differences in mean scores on the X and Y subscales.

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Results Structure

- 1. Whether to separate results and discussion?
- 2. How to structure the results?

Organizing principle:

The results chapter (as well as the discussion chapter) can be organized on the basis of the research questions (White, 2011).









Tables and Figures



Your thesis is NOT an information dump



• It is important that only data which helps to answer the research question(s) is presented...

How, though, to order the subheadings? Both empirical and qualitative studies generally produce a far greater body of analysed data than will appear in the final draft of the results section or sub-sections. It is often difficult, therefore, when initially confronting the data to know where to start and easy to succumb to the temptation of trying to include as much as possible. The consequence of doing so in both qualitative and empirical theses is loss of direction. This is usually indicated in the latter by a long and confused sequence of tables and figures. What is needed, therefore, is sufficient data to provide coherence to the description provided but not so much as to disturb its clarity. Both to achieve this balance and to provide logic to the manner in which the data are ordered, a clear idea of the narrative to be presented should be developed. Only in this way will the examiners know where they are being led.

(White, 2011, p. 273) *E-book avail at Lib.*

Figures should speak for themselves



 Typically used to illustrate objects, scenarios, theoretical models etc or to report measurements (as in the example below)



(Gibson, 2015, p. 304)





Either before or after the figure, there is typically a brief explanation, highlighting (and / or explaining) the most relevant finding

Actigraphy data.

There were seven complete days of actigraphy data available from Andrew at both Times 1 and 2

(Appendix 21, Figure A.16). The sleep propensity curves using these data show a reduction in daytime sleep

at Time 2, he was also going to bed slightly later and getting up slightly earlier compared to Time 1 (Figure

5.36).

(Gibson, 2015, p. 303 - 304)





Tables are used to provide a detailed summary of results

Table 5.50

Comparison of Questionnaire and Diary Data at Times 1 and 2 Concerning PWD 9

Variable	PWD T1	PWD T2	Points of improvement (+) or deterioration (-)
Day sleep (hrs)	1.0	0.0	-1.0
Night sleep (hrs)	6.5	8.8	+2.3
PSQI (0-21)	3.0	5.0	-2.0
SDI (0-12)	0.1	0.0	+0.1
Rating of nights' sleep (1-7 median, range)	2.0 (2-4)	2.0 (2-5)	No change
MMSE (30-0)	7.0	6.0	-1.0
QOL-AD PWD (52-13)	39.0	32.0	-7.0
QOL-AD carer (52-13)	35.0	34.2	-0.8
RMBPC memory frequency (0-28)	25.0	21.0	+4.0
RMBPC memory carer reaction (0-28)	4.0	6.0	-2.0
RMBPC depression frequency (0-36)	3.0	1.0	No change
RMBPC depression carer reaction (0-36)	2.0	1.0	No change
RMBPC disruption frequency (0-32)	7.0	9.0	-2.0
RMBPC disruption carer reaction (0-32)	6.0	8.0	-2.0
RMBPC global frequency (0-96)	35.0	31.0	+4.0
RMBPC global carer reaction (0-96)	12.0	15.0	-3.0

(Gibson, 2015, p. 303)





These are typically followed by a paragraph which highlights the points of interest and provides some explanations

At Time 2 Andrew still rated his sleep as "fairly good". His PSQI and SDI scores remained within the normal range, however decreased in severity since Time 1. This was due to him having some trouble getting to sleep There was some improvement in the frequency of his memory-related symptoms at Time 2 ...







NEW

It is important that the text **comments on**, rather than repeats information presented visually

There was no significant difference in the SnNR between day and night for passerine birds except one call example of saddleback (sad1; Table 3.5). At night, SnNR was higher compared to the day for most of the other bird sounds (Fig. 3.4). It is evident from these results that the sound transmission of nocturnal birds was significantly better during the night compared to the day. Bittern and kakapo booms consistently followed the opposite pattern (their SnNR was significantly higher during the day).





Theses based on quantitative data typically include numerous tables and figures like the ones shown above in the results section(s)

You'll need to learn how to format these (e.g. using MS Word etc), so that you can automatically generate lists of tables and figures



NEW



Examples of lists of figures and tables

LIST OF FIGURES

Figure 2.1 Schematic representations of mechanical devices used to produce emulsions: (a) high pressure valve homogeniser, (b) microfluidiser and (c) ultrasonic probe homogeniser
Figure 2.2 Schematic illustration of movement of organic solvent in oil droplets during preparation of nanoemulsions using emulsification and solvent displacement-evaporation. The aqueous phase contains water and emulsifiers
Figure 2.3 Examples of TEM images of β -carotene nanodispersions using (a) resin embedding and (b) freeze-fracture replica methods. $\hfill 25$
$\label{eq:Figure 2.4} \begin{tabular}{lllllllllllllllllllllllllllllllllll$
Figure 2.5 Schematic illustrations of spray dryer and freeze dryer (showing the major components)
Figure 2.6 Schematic illustrations of air flow movements in spray dryers: (a) co- current, (b) counter current and (c) mixed flow patterns
Figure 2.7 Chemical structures of (a) lutein and (b) lutein esters
Figure 2.8 Schematic representations of emulsion structures that may be formed in emulsions containing two different biopolymers denoted as "A" and "B": (a) single layer, (b) bilayer and (c) mixed layer
Figure 2.9 Schematic illustrations of cell absorption by (a) paracellular and (b) transcellular mechanisms
Figure 3.1 Schematic illustration of a combined method of high pressure homogenisation and solvent evaporation used to produce nanoemulsions
Figure 3.2 Pictures of (a) laboratory scale microfluidiser (M-110P) and (b) rotary evaporator
Figure 3.3 Pictures of (a) Zetasizer Nano ZS and (b) Mastersizer 2000 equipped with the Hydro 2000MU
Figure 3.4 Picture of a transmission electron microscope
Figure 4.1 Particle size distributions of WPI-stabilised nanoemulsion during preparation. A coarse emulsion was formed by mixing the aqueous phase and organic phase using high shear mixer. The coarse emulsion was homogenised using a microfluidiser at 80 MPa for 4 cycles and evaporated using a rotary evaporator (50°C; 153 mBar) to remove ethyl acetate

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xvi

NEW

Teo, 2016, p. x

Teo, 2016, p. xvi



It is also common to include lists of technical terms, symbols, abbreviations, etc – so this is something to build up as you go along.

LIST OF SYMBOLS

LIST OF ABBREVIATIONS

0	M State and	AMD	Age-related macular degeneration
-	Mass sensitivity constant	AMY	Amylase
D	Translational diffusion coefficient	ANOVA	Analysis of Variance
D _{3,2}	Surface weighted mean	APS	Ammonium persulphate
D _{4,3}	Volume weighted mean	BUT	hutrilated hydroxyl toluene
f(ĸa)	Henry's function	BHI	
-	Considerational according	CaCl ₂	Calcium chloride
g	Gravitational acceleration	CC	Coconut oil
h	Thickness	CCP	Colloidal calcium phosphate
K	Boltzmann's constant	CIE	Commission Internationale de L'Eclairage
k	Rate constant	CR	Corn oil
n	Overtone number	DE	Dextrose Equivalence
r	Radius	DLS	Dynamic Light Scattering
Т	Temperature	DMEM	Dulbecco's modified eagle medium
U _E	Electrophoretic mobility	DMSO	Dimethyl sulfoxide
v	Creaming velocity	EE	Encapsulation efficiency

Teo, 2016, p. xviii

Teo, 2016, p. xix







Results style



Tenses



Although the emulsions were physically stable during storage, it was observed that the colour of all the emulsions faded slightly over time and became lighter especially at higher temperature of 40oC (Figure 8.4). Initially, the emulsions were orange in colour as lutein **is** a colour pigment with an intense yellow-orange (depending on the concentration) but the colour intensity of emulsions became lighter due to chemical degradation of lutein. Indeed, the L value of emulsions increased while the colour parameters were found to decrease during storage at higher temperatures (Table 8.3). The L value measures lightness and an increase in L value indicates colour fading of emulsions during storage (Qian, Decker, Xiao & McClements, 2012). A decrease in positive a value **indicates** a decrease in the redness of the emulsions while a decrease in positive b value indicates a decrease in the yellowness (Qian et al., 2012). Therefore, the colour measurements **indicate** some loss or change of colour in the emulsions during storage, also indicating the degradation of lutein.

Summary of results (past)

Theory / Facts (present)

Interpretation (present)

NEW

Teo, 2016, p. 198



Table 5.3 **summarises** the performance of each detector on natural noisy field recordings using the threshold given in the previous section. This table reflects a single point of each ROC curve in Fig. 5.7 which matches the selected threshold. The wavelet filtering algorithm achieved more than 95% recall in detecting close-range calls ('very loud' and 'loud'). Even when the calls were very faded the recall was just below 70%. The detector was successful in detecting 30% of extremely faded calls. In the case of bittern and k⁻ ak⁻ ap⁻ o booming calls we had to revisit the human ground truth labels after using our algorithm: a few extra calls were found by our algorithm, and after retrospective consideration, included to the annotation.

Describing tables or figures (present)

Summary of results (past)

Priyadarshani, 2017, p. 141



Practice

Which was the original tense?



NEW

We evaluate / evaluated our method with the common energy based thresholding (Jinnai et al., 2012) and median clipping (Lasseck, 2013, 2015b). Table 5.5 summarises / summarised our findings on the same dataset as presented in the previous section (Table 5.3 and Table 5.4). We **count / counted** the number of seconds of target sounds detected instead of number of bird calls. As we mention / mentioned before, this is not a perfect comparison, because the reference methods are detecting any sound, while the wavelet filter only detects / detected target bird sounds. The overall recall of the proposed segmentation by wavelet filtering method (78%) is / was better than time domain energy thresholding (47%) and spectrogram-based median clipping (30%). Another method that could be used would be spectrogram crosscorrelation (Cortopassi and Bradbury, 2000). However, this requires / required the manual selection of a large number of individual calls to act as templates, and degrades / degraded quickly with noise, and we therefore choose / chose not to use it here.

Priyadarshani, 2017, p. 141

Feedback



NEW

We evaluated our method with the common energy based thresholding (Jinnai et al., 2012) and median clipping (Lasseck, 2013, 2015b). Table 5.5 summarises our findings on the same dataset as presented in the previous section (Table 5.3 and Table 5.4). We **counted** the number of seconds of target sounds detected instead of number of bird calls. As we mentioned before, this is not a perfect comparison, because the reference methods are detecting any sound, while the wavelet filter only detects target bird sounds. The overall recall of the proposed segmentation by wavelet filtering method (78%) was better than time domain energy thresholding (47%) and spectrogram-based median clipping (30%). Another method that could be used would be spectrogram cross-correlation (Cortopassi and Bradbury, 2000). However, this requires the manual selection of a large number of individual calls to act as templates, and degrades quickly with noise, and we therefore **chose** not to use it here.

Priyadarshani, 2017, p. 141





Discussion style





Previous research has demonstrated that

The aim of this thesis was to build on these previous findings and further examine ... Specific objectives were to examine ... in order to determine ...

Briefly, chapter 3 investigated ... Chapters 4 and 5 compared. Chapter 6 examined ...

The following sections will focus on the general outcomes, results, conclusions and implications of the experiments of this thesis. Identified limitations and weaknesses of the research will also be discussed, followed by recommendations for future research. Finally, the main conclusions of this research will be summarised.



Rationale

Recap

Preview







Previous research (citation) .. indicates ... The results of Study 2 are similar. However, Furthermore,

Despite the fact that ... (citation), older participants in Studies 1 and 2 were less likely to report ... This pattern has been noted in previous studies .. The findings presented in Study 3 and elsewhere (citation) help to further explain this pattern.

Comparisons between findings and previous research / theory

Unlike the previous studies of younger New Zealanders (citation), Study 1 found ... This may be due to ... Sleep health might be better predicted by Future research incorporating ... would help to clarify these findings.

Tentative explanations

NEW

Practice Fill the gaps with words and phrases

The sample of carers in Study 4 had 1 _____ good sleep compared to some other groups of dementia carers ... 2 _____, carers in (citation) had an average sleep efficiency of 88%, 3 _____ those in Study 4 had an average of 88%. 4 _____, on the PSQI, 66% of Study 4 carers reported symptoms of sleep disturbance at Time 1. 5 _____ PSQI findings from previous studies with dementia carers (citations) and 6 _____ greater sleep disturbances than among non-carers. 7 _____ between subjective and objective sleep data have also been found in other samples of older carers (citations) and 8 ______ the psychosocial impact of caring on the symptoms of insomnia.

ARE LIKELY TO BE ASSOCIATED WITH DESPITE THIS THIS IS COMPARABLE TO FOR EXAMPLE RELATIVELY **INDICATES** WHEREAS DISCREPANCIES

Gibson, 2015, p. 330 - 331

1. relatively 2. For example 3. whereas 4. Despite this, 5. This is comparable to 6. indicates 7. Discrepancies 8. are likely to be associated with

Discussing findings



Providing background information: reference to the literature

Providing background information: reference to the question

Restating the result or one of several results

Indicating an unexpected outcome

Comparing the result: supporting previous findings

Comparing the result: contradicting previous findings

Offering an explanation for the findings

Advising cautious interpretation of the findings

Suggesting general hypotheses

Noting implications of the findings

Commenting on the findings

Comparing the result: contradicting previous findings - close

This study has been unable to demonstrate that ... However, this result has not previously been described. This outcome is contrary to that of Smith et al. (2001) who found ... This finding is contrary to previous studies which have suggested that ... In contrast to earlier findings, however, no evidence of X was detected. The yields in this investigation were higher compared to those of other studies. However, the findings of the current study do not support the previous research. Smith et al. (1999) showed that ... This differs from the findings presented here ... The overall level was found to be 15%, lower than that of previously reported levels. It has been suggested that ... (Smith et al., 2002). This does not appear to be the case. The levels observed in this investigation are far below those observed by Smith *et al.* (2007). These results differ from X's 2003 estimate of Y, but they are broadly consistent with earlier ...

phrasebank.manchester.ac.uk

Giving suggestions for future work





Resources





Advice, resources, and information about events are available on Stream

Doctoral Community (Doctoral Community)



Academic writing and learning support (Academic support)





ACADEMIC Q & A (see under Academic Support on Stream)



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The Literature Review

Massey University



The Research Proposal



5

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The thesis whisperer: thesiswhisperer.com

Doctoral writing SIG: doctoralwriting.wordpress.com

White, B. (2011). *Mapping your thesis: The comprehensive manual of theory and techniques for masters and doctoral students*. Camberwell, Australia: ACER

Dunleavy, P. (2003). *Authoring a PhD*. Basingstoke, England: Palgrave MacMillan.



THANKS FOR COMING ALONG!



See these slides online at: tinyurl.com/quantchapters2018

Next workshop here:

Writing results and discussion chapters for qualitative research Weds October 9th 12 pm – 1.30 pm