

<http://researchcommons.waikato.ac.nz/>

Research Commons at the University of Waikato

Copyright Statement:

The digital copy of this thesis is protected by the Copyright Act 1994 (New Zealand).

The thesis may be consulted by you, provided you comply with the provisions of the Act and the following conditions of use:

- Any use you make of these documents or images must be for research or private study purposes only, and you may not make them available to any other person.
- Authors control the copyright of their thesis. You will recognise the author's right to be identified as the author of the thesis, and due acknowledgement will be made to the author where appropriate.
- You will obtain the author's permission before publishing any material from the thesis.

COOPERATION IN MAORI AND EUROPEAN
CHILDREN

Glynis Price Vercoe

Submitted in part fulfilment for the degree of

BACHELOR OF PHILOSOPHY

in

PSYCHOLOGY

at

THE UNIVERSITY OF WAIKATO

Hamilton, New Zealand

1971

ACKNOWLEDGEMENTS

I would like to thank the South Auckland Education Board, and the principals, staff and pupils of the following schools for their cooperation and assistance: Huntly Primary and Huntly West Primary schools in Huntly, and Bernard Fergusson, Ngaruawahia Public and Waipa Primary schools in Ngaruawahia. I wish to express my special thanks to my supervisor, P. N. Hamid, for his assistance and encouragement over the past year.

TABLE OF CONTENTS

	Page
1. INTRODUCTION	1
Hypotheses	11
2. SELECTION OF INSTRUMENTS	13
Definition of terms	13
Measurement of performance	14
Measurement of cooperative orientation	16
Hypotheses	28
3. METHOD	30
Subjects	30
Performance measure	31
Prisoner's Dilemma	35
Procedure	37
Statistical Analysis	45
4. RESULTS	48
Hypotheses 1 and 2	48
Hypothesis 3	51
Hypothesis 4	58
Hypothesis 5	62
Distribution of outcome possibilities	65
5. DISCUSSION	67
Suggestions for future research	77
REFERENCES	80

TABLES

	Page
1. Classification of Sample by Ethnic Origin and Sex	30
2. Analysis of Variance Table for Order Effects and Comparability of Sets of Problems	32
3. Distribution of Subjects in Groups for Measurement of Performance	34
4. Payoff Matrix for the Prisoner's Dilemma Game	36
5. Analysis of Variance Table for the Performance of Subjects in Cooperative and Competitive Social Situations	49
6. Mean Performance Scores of Maori Children in Cooperative and Competitive Social Situations.	51
7. Mean Number of Cooperative Responses over 50 Trials of the PDG by Dyads	52
8. Mean Number of Cooperative Responses over the Last 25 Trials of the PDG by Dyads	52
9. Mean Number of Cooperative-following-defection Responses over 50 Trials of the PDG by Dyads	55
10. Mean Number of Cooperative-following-defection Responses over the Last 25 Trials of the PDG by Dyads	56
11. Mean Number of Cooperative Responses over 50 Trials of the PDG by Maori Children	60
12. Mean Number of Cooperative Responses over the Last 25 Trials of the PDG by Maori Children	60
13. Mean Number of Cooperative-following-defection Responses over 50 Trials of the PDG by Maori Children.	62
14. Mean Number of Cooperative-following-defection Responses over the Last 25 Trials of the PDG by Maori Children	62
15. Mean Number of Cooperative Responses over 50 Trials of the PDG by European Children	63
16. Mean Number of Cooperative Responses over the Last 25 Trials of the PDG by European Children	63

TABLES (Cont.)

	Page
17. Mean Number of Cooperative-following-defec- tion Responses over 50 Trials of the PDG by European Children	64
18. Mean Number of Cooperative-following-defec- tion Responses over the Last 25 Trials of the PDG by European Children	64
19. Percentage of Responses in Each Type of Outcome Possibility by Dyads	65

CHAPTER 1

INTRODUCTION

The object of this study is to compare the cooperative behaviour of Maori and European children and to investigate and compare the effects, upon the performance of the two ethnic groups, of working under cooperative conditions and under competitive conditions. Certain differences are expected to exist between the two ethnic groups as a result of the different child rearing practices employed by the Maoris and by the Europeans.

The Beagleholes (1946) described the Maori character as "...a generous, friendly, co-operative giver, one who always inclines to give back more than he receives." (Beaglehole and Beaglehole, 1946, p.143). They also write that "...while the Maori works extremely hard and very industriously when working in and for a co-operative group, he is characteristically without individual economic forethought and thriftiness, somewhat irresponsible according to pakeha ideas, and a spendthrift, ... one who works casually or in spurts when working for himself, ..." (Beaglehole and Beaglehole, 1946, p.146). Joan Metge (1967) also subscribes to this view of the Maori as cooperatively oriented and performing better in a cooperative group situation.

In relation to sport, for example, "...Maoris show a decided preference for sports which involve team practice ... They work best in a team..." (Metge, 1967, p.141), and Metge refers to "...the typically Maori enjoyment of group action toward a new goal." (Metge, 1967, p.110).

The Rakau studies (Earle, 1958; James Ritchie, 1956; Jane Ritchie, 1957) found that there was a basic Maori child rearing pattern that clearly differed from the European pattern - these findings are supported by similar results from the work of the Beagleholes (1946) in Kowhai and Joan Metge's work in Kotara and Auckland between 1953 and 1958. That is, the pattern, which is a result of the Maori tendency to have large families, the depressed economic conditions and the traditional attitudes and practices, seems to be typical for most Maori families.

The basic pattern of Maori child rearing involves a "golden world of love and affection" (Beaglehole and Beaglehole, 1946, p.144) for the first few years of life. During these early years the child is the centre of attention and gets what he wants, when he wants it, and receives as much affectionate attention as he desires. The mother takes her baby with her to any social events, and once there the baby is passed around to be cuddled and nursed.

However, this period of the child's life soon comes to an end, usually when another baby arrives, the mother then devoting most of her time to the new baby. The toddler is not completely ignored by the mother as soon as the new baby arrives. Rather the new baby is now the centre of attention and his wants and needs are satisfied before the mother will attend to the toddler, who consequently receives considerably less love and attention from the mother than previously.

The Beagleholes (1946) found that in Kowhai this rejection occurred when the child was three or four years old, but in Rakau the change took place when the child was two or three - Ritchie (1956) attributes this difference in the age at which rejection occurs to the more rapid rate of population increase in Rakau. Ritchie (1956) further points out that this rejection is not objectively severe but is severe only when compared with the affection and attention the child receives prior to the rejection. The significance of the rejection is due to its suddenness and contrast to the previous experiences of the child.

Following this rejection, the child changes from "... the familiar smiling child ... into a weeping, ailing child ..." (Ritchie, 1956, p.39)

and as such constitutes a nuisance around the home. The mother deals with this problem by assigning the child to the care of one of his older siblings. Thus, following the rejection phase, the child becomes progressively more independent of his mother, at the same time becoming more dependent on substitute gratifications provided by siblings and peers. There are a few children who are able to win parental attention and approval by behaving in such a way that they keep parents and visitors amused, but the majority of the children regain security by associating with their peers and siblings.

Ritchie (1956) explains that this rejection is not limited to Maori society but occurs in all societies as part of the growing-up process. There is a difference, however, in that the independence from his parents that the young Maori child achieves is not experienced by a child in European society until the individual has reached late adolescence at which time the individual is "... considerably better equipped to withstand it [independence]..." (Ritchie, 1956, p.39).

During his middle-years (approximately six to thirteen years of age) the Maori child is not closely involved with the family group and tends to remain in the home only as long as it is necessary for him

to complete his allotted tasks - only the older children have any responsibility placed upon them, the younger children generally working for someone else and not receiving any reward or satisfaction and therefore wanting to simply finish the task as quickly as possible and get away. The middle-years children do attend organised social activities, but they have very little contact, if any, with their parents once they have arrived at these activities. Margaret Earle (1958) found that the parents have a general interest in their middle-years children but are not interested in them individually and there is "... no close and intimate contact between parent and child during this period." (Earle, 1958, p.20). The capriciousness of the behaviour of the parents towards the children - reward and punishment depending upon the parent's mood rather than the behaviour of the child - encourages the children to spend as much time as possible out of their parents' way and the middle-years children consequently prefer to spend their time with their peer group.

Margaret Earle (1958) found that in the play groups of the middle-years children the standards of behaviour were largely determined by the children themselves. Positively valued behaviours were kindness, sharing, cooperation and friendliness,

while behaviours such as aggression were negatively valued. The play groups tended to be large and close-knit, providing a situation in which members receive mutual support and a certain degree of security. Only a limited degree of security is achieved, however, as some threat of rejection is still present, resulting in caution, a lack of real trust, and the expectation of further rejection. Defences against this possible rejection develop, one of them being non-achievement in Maori social situations.

The Maori's need for love and approval following his rejection inhibits the development of any strong drive for personal achievement. Being better than or different from the group leads to criticism from other group members. Margaret Earle (1958) found that those children who set their aspirations at a level that the rest of the group considered to be too high were "... cut down to size by their friends, ..." (Earle, 1958, p.28). The Maori child consequently learns to limit his achievement to levels acceptable to the group. Ausubel (1961) mentions the importance that Maori culture attaches to status acquired from group psychological support and membership in and acceptance by the group. This emphasis results in a lower level of need for personal achievement in Maori culture than is found in Western civilisation. ✓

The Maori feels less need than the European to demonstrate his value through performance because, unlike the European, his status is not derived from his performance.

Gang membership during the middle-years is important to both Maori and European children. There is a difference, however, in that the European child of this age, while being a member of such peer groups, also has a close association with his family, a closer association than that experienced by the Maori child. Although the European child spends some of his time outside the home, much of his time is spent within the home environment or else within hearing distance of the mother. For the European child "... first loyalty, first identification and first reference group, continues to be the family." (James Ritchie, 1956, p.43) whereas in the case of the Maori child the family comes second, as the dependence of the middle-years Maori child is centered upon his peer-group and he is largely independent of his home.

Jane and James Ritchie (1970) found that, contrary to expectations arising from the Rakau studies, there was no indication that the three groups of Maori mothers in their study - those living in the pa, those in the small town, and those

in the city - showed an earlier and more severe inhibition of dependency than the European groups - rural, small town, and city. However, they do not view this as necessarily indicating that the pattern does not exist, as the Maori mothers, especially those living in the pa, were unable to understand the questions asked relating to dependency. The Ritchies found that although they themselves had seen Maori children acting dependently, the mothers did not perceive this behaviour as a problem but rather as a behaviour that is best ignored. The Maori child in the pa or small town tended to protest if the mother went away, whereas for the children in the other groups the departure of the mother for a short while constituted no great problem, very little protest at all occurring in 64% of these cases (Ritchie and Ritchie, 1970, p.69).

The Maori mothers in the small town live in a different situation from those in the pa in that they are no longer surrounded by relations upon whom they can depend. However, the Ritchies found that the small town Maori mother remains Maori in her child rearing methods because she lacks a technique by which she can change "... the psychological stance of the child when he assumes an independence she has in fact encouraged him to take." (Jane and James Ritchie, 1970, p.142). The Maori mothers

in the city differed from those in the pa and the small town, their methods tending to be indistinguishable from the European child rearing patterns except in very minor respects. There were still some aspects of the Maori child rearing pattern which had persisted and which were occasionally apparent. This tendency to move away from the traditional child rearing pattern as one moves from the pa, to the small town, and then to the city suggests that where the family is living in a city and not in a Maori community, it is possible that the differences between Maori and European children with regard to cooperation will be less than the differences between the two ethnic groups living in the other areas.

Despite this tendency towards a more European pattern of child rearing, the Ritchies (1970) conclude that there is a distinct Maori child rearing pattern which, although changing, is not doing so solely in the direction of the European pattern.

Research in Hawaii (Howard, 1969) found a very similar child rearing pattern among the Hawaiians to that of the Maoris in the Rakau studies: "By the time these children reach the intermediate grades (4th on up) they have learned to care little about adult approval. Instead they are very much concerned for their relations with peers, who have

become their main source of interpersonal satisfaction." (Howard, 1969, p.8). The parallel with the Maori child rearing pattern lies in the tendency for the Maori child to associate with his peers and brothers and sisters in preference to his parents, whom he avoids as much as possible, and thus to develop a similar dependence on his peers to that of the Hawaiian child, resulting in a concern with relationships with peers rather than with relationships with parents. Howard (1969) mentions that one frequent consequence in Hawaii of this situation is that "... the competitive framework upon which our school system is based operates in reverse. When children are asked to compete for various forms of approval they are essentially being asked to opt for their relationship to the teacher against their fellow students, but for Hawaiian children peer approval is more important and the competitive structure tends to inhibit performance." (Howard, 1969, p.8). A similar situation may be expected to exist with Maori children in New Zealand. As a result of the tendency for the Maori child to be more dependent on his peer group than the European child for whom the family is still an important provider of security, it is expected that the Maori child would be more cooperatively oriented, and perform better under

cooperative conditions than under competitive conditions. This does not imply that European children are not cooperatively oriented but that the degree of cooperative behaviour is greater in the Maori child, and that the difference in performance under cooperative and competitive conditions is expected to show a greater improvement under the cooperative condition for the Maori child than for the European child.

Further theoretical support for the anticipated differences is provided by the non-achievement motivation that peer dependency produces in the Maori child and the emphasis in Maori culture upon status derived from group membership. The European child, brought up in a more individualistic and more personal-achievement oriented society, is at liberty to strive for personal achievement and would therefore be expected to behave less cooperatively than the Maori child.

Hypotheses

The hypotheses to be investigated in this study can therefore be stated as follows:

Hypothesis 1: That Maori children will perform significantly better in a co-operative social situation than in a competitive social situation.

Hypothesis 2: That performance of the Maori children will be significantly better in a cooperative social situation as opposed to a competitive social situation than will the performance of the European children.

Hypothesis 3: That Maori children will exhibit a significantly greater level of cooperative behaviour than European children.

CHAPTER 2

SELECTION OF INSTRUMENTS

There have been no other studies conducted comparing the cooperative behaviour of Maoris and Europeans. Therefore, the studies to be mentioned in this section, which were mainly conducted in the United States of America, are of interest principally for their methodology, and the specific results of each study will only be mentioned if the results are relevant to the methodological aspects under consideration.

Definition of terms

In the present study the definitions of cooperation and competition adopted were those proposed by Deutsch (1950) who, in line with other social theorists (May and Doob, 1937; Mead, 1937; Maller, 1929), perceives the major difference between the two social situations to be in the nature of the goal-regions. In a cooperative social situation the goals of the people concerned are "promotively interdependent" (Deutsch, 1950, p.132) - that is, "... a goal-region can be entered (to some degree) by any given individual or sub-unit only if all the individuals or sub-units under consideration can also enter their respective goal-regions (to some degree)." (Deutsch, 1950, p.132). In a competi-

tive social situation, on the other hand, the goals are "contriently interdependent" (Deutsch, 1950, p.132) and "... if a goal-region is entered by any individual or sub-unit ... the other individuals or sub-units will, to some degree, be unable to reach their respective goals ..." (Deutsch, 1950, p.132).

That is, in a cooperative social situation either all those involved achieve their goals or no one does, whereas in a competitive situation only one individual can achieve his goal, his goal achievement precluding the possibility of the other individuals involved reaching their goals.

From this, a person can be said to be cooperating or cooperative when he acts to achieve his own goal in such a way as to enable others to achieve their goals as well. Correspondingly, a person is competing or competitive if his goal-directed behaviour is such that others are prevented from attaining their goals if he achieves his.

Measure of performance

Only one study has been conducted comparing performance under cooperative and competitive conditions between different groups (Madsen, 1967).

Madsen (1967) used a task consisting of a sheet of paper containing 176 X's and the subjects were required to draw circles around as many X's as they

could in two minutes. In the competitive condition the child who circled the most X's received a piece of candy and their partner - the children worked in pairs - received none. In the cooperative condition each subject was asked to work for his partner and each child received candy according to the number of X's circled by his partner.

Many other studies have been carried out comparing the differential effects of cooperative and competitive social situations upon performance, but these have not compared different populations. Several of them (Whittemore, 1924; Bruning et al, 1966; Huddle, 1967; Teasdale and Joynt, 1967) have compared performance on tasks involving motor abilities. In the present study it was considered preferable to consider the performance of subjects on some task relevant to their school life as the obtained results would then have greater applicability to education. The findings reported by Howard (1969) suggest that the Maori child might be at a disadvantage in a competitive grading system.

Several studies have compared performance under cooperative and competitive conditions in an educational setting. Deutsch (1951) and Haines and McKeachie (1967), working with college students over one term of the college year, compared performance in discussion

situations where either all received the same grade according to the group's performance, or the subjects were compared and ranked within their groups. This was not possible in the present situation, firstly because of the age of the subjects, and secondly because of the lack of time which made it necessary that a measure of performance be obtained at one session.

As there were no tasks suitable for the present study available, a task was constructed similar to that used by Hurlock (1927) for a comparison of the effect of group rivalry upon performance - Hurlock (1927) used sets of addition arithmetic problems. In the present study sets of subtraction equations were constructed. This type of task was readily amenable to comparison of performance in cooperative and competitive conditions and was also relevant to the school situation.

Measurement of cooperative orientation

Several studies have investigated differences in cooperative orientation across cultural groups or between subgroups within a culture. In these studies a numerical measure of the level of cooperation displayed has been obtained by either one of two methods - the Madsen Cooperation Board or a version of the Prisoner's Dilemma Game.

The first of these, the Madsen Cooperation Board, was developed by Madsen (1967) for use in a study of children in three Mexican sub-cultures. The Board consists of a square with one eyelet at each corner and strings which are threaded through each eyelet and connected to a metal weight in the centre which holds a ball-point pen. For each trial, a sheet of paper with circles drawn at the midpoints of the sides is placed on the Board and the task requires the subjects to draw a line through the circles. An individual child can only pull the pen towards himself and, as the circles are not directly in front of the subjects, cooperation is required for the children to perform the task.

Madsen (1967) worked with groups of four children, one child positioned at each corner of the Board, and with four circles on the sheets of paper. Madsen (1967) induced a cooperative orientation and then a competitive orientation in her subjects by telling the subjects in the first half of the experiment that if the circles were crossed in a set order each subject would be rewarded and, in the second half, giving instructions to the effect that each subject would be rewarded for the number of times the pen crossed the circle to his right.

The Madsen Cooperation Board has also been employed by Nelson and Madsen (1969) in their study of Negro and Caucasian four-year-olds and by Shapira and Madsen (1969) in their study of kibbutz and urban children in Israel. In both of these studies the groups worked under both cooperative and competitive conditions, established by instructions indicating group reward (where all receive a reward or none do) and individual reward (where only one person receives a prize) respectively.

The procedure in these three experiments was to compare the amount of cooperation exhibited by the two groups in the cooperative and competitive situations. Madsen (1967), for example, found that the urban middle-class children exhibited a greater level of competitive motivation under both orientation conditions than either the urban poor or the rural groups.

A disadvantage of the Madsen Cooperation Board is that scores are obtained only for each group as a whole and not for individual members in each group. This was felt to be a disadvantage of the Board in relation to the present study as the effect of groups of Maori and European children working together was also of interest. Sibley, Senn and Epanchin's (1968) work with Negro and white adolescents suggests that

heterogeneous groups show a lower level of cooperation than homogeneous groups. Sibley et al (1968) found a small but consistent difference between heterogeneous and homogeneous groups in that when subjects were paired with a partner of a different race they were less cooperative than when they were paired with someone of the same race as themselves. Harford and Cutter (1966), however, found that although the level of cooperation decreased from Game 1 (homogeneous dyads) to Game 2 (heterogeneous dyads) the level also decreased when subjects played both games with a partner of the same race. That is, there was a significant decrease in the level of cooperation over the two games regardless of whether the dyads in the second game were homogeneous or mixed. The decrease in level was therefore not necessarily due to the fact that the subject was playing a partner of a different race - the decrease could have been merely an order effect due to experience. However, Sibley, Senn and Epanchin (1968) controlled for order effects by having half the subjects play first in a mixed dyad and half play first in a homogeneous dyad and thus their finding that subjects exhibited less cooperation in mixed dyads than in homogeneous dyads cannot be attributed to experience. As it was considered

worthwhile to investigate cooperation of Maori and European children for same and mixed race dyads, it was necessary to have individual scores for the Maori and the European subjects under both conditions and the Madsen Cooperation Board was inappropriate.

The rationale behind the Prisoner's Dilemma Game (PDG), the second method of measuring cooperation, can be most easily understood from consideration of the prisoner's dilemma interpretation of the game:

Two suspects are taken into custody and separated. The district attorney is certain that they are guilty of a specific crime, but he does not have adequate evidence to convict them at a trial. He points out to each prisoner that each has two alternatives: to confess the crime the police are sure they have done, or not to confess. If they both do not confess, then the district attorney states he will book them on some very minor trumped-up charge such as petty larceny and illegal possession of a weapon, and they will both receive minor punishment; if they both confess they will be prosecuted, but he will recommend less than the most severe sentence; but if one confesses and the other does not, then the confessor will receive lenient treatment for turning state's evidence, whereas the latter will get "the book" slapped at him. ... The problem for each prisoner is to decide whether to confess or not. (Luce and Raiffa, 1957, p.95).

The PDG is an example of a non-zero-sum (or mixed motive) game - that is, it is a game in which one player's gain is not necessarily, or always, the other player's loss, and it is possible for both players to gain on a particular trial or for both to lose. In the theory of non-zero-sum games the PDG is a noncooperative game in that no communication is permitted between the players for them to work out a strategy.

The payoff matrix for the PDG is as follows:

	B_1	B_2
A_1	(x_1, x_1)	(x_2, x_3)
A_2	(x_3, x_2)	(x_4, x_4)

where A_1 represents a cooperative choice by player A and B_1 represents a cooperative choice by player B, and A_2 and B_2 represent defecting choices by players A and B respectively. x_1, x_2, x_3 and x_4 represent the payoffs to subjects A and B resulting from their choices whether to act cooperatively or not, the payoff to subject A being given first in each bracketed pair. The values of the payoff matrix are subject to the following conditions:

- i) $2x_1 > x_2 + x_3 > 2x_4$
- ii) $x_3 > x_1$
- iii) $x_3 > x_2$
- iv) $x_4 > x_2$

(Rapoport and Orwant, 1962, p.5)

The main feature of the PDG is that for both players strategy 2 (the defecting choice which represents a refusal to cooperate) dominates strategy 1 (the cooperative choice), A_2 dominating A_1 for the row player and B_2 dominating B_1 for the column player, as x_3 is the highest payoff value. However, if both players select strategy 2 then their individual payoffs are less than their payoffs if they both chose strategy 1, as x_4 is smaller than x_1 .

Rapoport and Orwant (1962) mention two studies by Deutsch (1958, 1960a) which show that behaviour in the PDG is a function of personality factors. Deutsch (1958, 1960a) induced, by instructions, either one of three motivational orientations in his subjects - cooperative, the subjects being told to consider themselves as partners and to be interested in the other's payoff as well as their own; individualistic, in which the subjects were told that their only motivation was to win as much money for themselves as possible, and that the game was not a competitive one; and competitive, in which the subjects were told that they were to win as much money for themselves as possible and also to do better than their partner. He found that there was a strong correlation between the motivation given to the subjects and their behaviour in the PDG. Deutsch

(1960b) also conducted an experiment in which he did not induce any specific orientation in the subjects - he found that the subjects' game behaviour correlated highly with the subjects' scores on the F scale in that most subjects who made trusting and trustworthy scores in the PDG had relatively low scores in the F Scale, whereas those with high scores on the F Scale tended to make suspicious and untrustworthy choices. Rapoport and Orwant concluded that "... behavior on the Prisoner's Dilemma type game is a function of personality factors, whether induced by giving the subjects motivational orientations or giving them none, in which case they supply their own, ... It seems that in this type of game where "rationality" prescribes no precise strategy, the individual's motivation, whether inherent or induced, determines his strategy." (Rapoport and Orwant, 1962, p.17). It therefore appears valid to use the number of cooperative responses in the PDG as a measure of cooperative orientation.

A version of the PDG was used by Sampson and Kardush (1965) and Harford and Cutter (1966) in comparative studies of Negro and white boys and girls. Harford and Cutter (1966) worked with integrated, ethnically mixed dyads and with ethnically homogeneous, segregated dyads. In analysing the data they obtained,

individual scores were used - that is, the amount of cooperation for each individual subject.

Sibley, Senn and Epanchin (1968) investigated the cooperative behaviour of Negro and white adolescents in a fifty-trial PDG. The dyads were asked to try and gain as many points as possible, and the data analysed by Sibley et al (1968), like that of Harford and Cutter (1966), consisted of the number of cooperative responses made by each subject.

Meeker (1970), in a study of a West African tribe, used two types of two-person mixed motive games - the PDG and the Maximising Difference Game. In the Maximising Difference Game (MDG), which is a modification of the PDG developed by McClintock and McNeel (1966, 1967), a non-cooperative choice (which may be called competitive rather than defective as in the PDG) gives the subject a higher score than that of his opponent but at the same time lowers his absolute score. Consequently, competition in the MDG is attributable to a wish to win relative to someone else, whereas in the PDG a non-cooperative choice can also be motivated by a desire to win as much as possible for oneself.

In the present study, the PDG was selected as the instrument for the measurement of cooperative tendency rather than the Madsen Cooperation Board or the MDG. The Madsen Cooperation Board was rejected for the reason mentioned earlier - that

individual scores are not readily obtainable - and the MDG was rejected because the present study is concerned with cooperative orientation rather than competitive orientation. In the MDG, if the subject wishes to maximise his payoff he will choose the cooperative strategy and a cooperative choice can therefore be based on either a desire to cooperate and/or a desire to maximise one's gain. The PDG, in which a cooperative choice does not necessarily maximise one's potential gain (more can be gained by a successful non-cooperative choice) does not have this confounding variable in the cooperative response and therefore is a purer measure of cooperation. The MDG, on the other hand, is a purer measure of competitive orientation as it eliminates the confounding variable of maximisation of gain from a competitive choice. Cooperation and competition are not necessarily opposites: non-cooperation does not necessarily imply competition nor does non-competition necessarily imply cooperation, and as the focus of this study is the cooperative orientation of the Maori and the European child, the PDG was selected as being the most suitable method for measuring the degree of cooperative orientation.

Rapoport and Chammah (1965) found that interaction effects in the PDG were very strong and tended

to make the members of a dyad behave like each other, the interaction thus having a strong effect on the total relative frequency of the cooperative responses in each game. They assumed that to the extent that the populations being compared are playing the game under identical conditions the differences in the total frequency of cooperation between the populations reflect a difference in some characteristic of the populations, whether the characteristic resides inherently in individuals in the population or in the way the individuals interact. Rapoport and Chammah (1965) therefore decided to evaluate performance in the PDG in the same way as it had been evaluated in previous studies - that is, in terms of the observed number of cooperative responses. However, unlike other studies, Rapoport and Chammah (1965) took the dyad, rather than the individual, as the unit of population because of the interaction effects. The work of Rapoport and Chammah (1965) suggests that the scores of dyads would be preferable to the scores of individuals as data. In the present study, however, individual scores will be considered when the effect upon performance of being a member of a mixed dyad as compared to a homogeneous dyad is investigated. The work of Sibley, Senn and Epanchin (1968) suggests that it is reasonable to expect that

there will be an overall decrease in the level of cooperation in the dyads. As the interaction within a dyad has an important effect upon the responses of the two players (Rapoport and Chammah, 1965), it is reasonable to expect that as a result of the interaction the players involved will reach a compromise in the level of cooperation exhibited. That is, as the European child is expected to be less cooperative than the Maori child, a Maori child will find that his partner is less cooperative when he is playing with a European child than when he is playing with a Maori child. Consequently, the Maori child's cooperative responses in a mixed dyad will be less frequently matched by a cooperative response from the subject's partner than in a homogeneous dyad, and should thus be more frequently punished by a defecting response from the partner, in which case the partner gains while the Maori subject loses. As a result, the Maori subject is likely to stop giving cooperative responses. It is anticipated that this will result in a decrease in the amount of cooperation exhibited by the Maori subject in a heterogeneous dyad as compared to a homogeneous dyad. In the case of the European child, the converse is expected. A cooperative response by the European subject will be less frequently punished by a defect-

ing response from the subject's partner when the subject is playing with a Maori child than with a European child, the former being expected to give cooperative responses more frequently. As the cooperative responses will therefore be rewarded by a cooperative response from the subject's partner more frequently than when the European child is playing in a homogeneous dyad, it is anticipated that the European child will exhibit more cooperative responses when playing in a mixed dyad than when playing in a homogeneous dyad.

Hypotheses

The hypotheses proposed at the conclusion of Chapter 1 are operationally defined as follows:

Hypothesis 1: That Maori children will obtain significantly higher scores on the performance task under cooperative conditions than under competitive conditions.

Hypothesis 2: That Maori children will show a significantly higher positive difference between cooperative and competitive condition performance scores than will European children.

Hypothesis 3: That Maori children will make a significantly higher number of strategy 1 choices (cooperative choices) in the PDG than will the European children.

The additional hypotheses concerning cooperative behaviour in mixed and homogeneous dyads proposed in this chapter are stated as follows:

Hypothesis 4: That Maori children in heterogeneous dyads will make significantly fewer cooperative choices in the PDG than will Maori children in homogeneous dyads.

Hypothesis 5: That European children in heterogeneous dyads will make a significantly greater number of cooperative choices in the PDG than will European children in homogeneous dyads.

CHAPTER 3

METHOD

Subjects

The sample consisted of 123 school children from 4 primary schools in the Waikato basin between the ages of seven-and-a-half and eight-and-a-half years as at 1 January 1971. The composition of the sample according to ethnic origin and sex is given in Table 1.

The majority of the subjects took part in one game of the PDG and in the performance section of the experiment, but some subjects only participated in one section, either because of absenteeism or because their results had to be eliminated for reasons that will be given later.

Table 1. Classification of Sample by Ethnic Origin and Sex

	Maori*	European	
Male	25	37	62
Female	28	33	61
Total	53	70	123

*a child was classified as a Maori
if both parents were Maori

Performance measure

For the performance measure, two sets of 30 mathematical problems, subtraction equations, were developed. The equations were of increasing difficulty and a time limit of five minutes was imposed, so that while all subjects would be able to attempt some of the equations, few would be able to solve all 30 equations correctly. There was a tendency among some subjects, after they had solved as many as they could, to hurry on and randomly answer the remaining equations, but as the number of equations the subjects answered correctly was used as the performance measure, this tendency did not seriously affect results.

The equations were constructed in pairs of two equations of similar difficulty. The degree of difficulty within the pairs was controlled by constructing two equations of the same form - for example, two-figure-two-figure, decomposition, lower decade being one. Once the pairs of equations had been constructed, one of each pair was randomly assigned to set A and the other to set B.

The two sets of equations were administered, without orientation instructions but with the time limit, to 25 seven-and-a-half to eight-and-a-half year olds, twelve Maoris and thirteen Europeans. Fourteen children were given set A first and then

set B, and eleven were given set B first and then set A. A two factor analysis of variance with repeated measures on the second factor was applied to the data to test for order effects and whether the two sets of problems were sufficiently similar for them to be regarded as comparable. Table 2, which gives the results of this analysis, indicates that there were no significant differences in performance on the problems resulting from the order of administration nor were there any significant differences between the two sets of problems. The two sets of problems can therefore be used to compare the performance of

Table 2. Analysis of Variance Table for
Order Effects and Comparability
of Sets of Problems

Source of variation	SS	df	MS	F
<u>Between subjs</u>		<u>24</u>		
A (order)	0.01	1	0.01	0.00008 n.s.
Subjs w. groups	3062.27	23	133.14	
<u>Within subjs</u>		<u>25</u>		
B (set)	0.22	1	0.22	0.04 n.s.
AB	0.62	1	0.62	0.12 n.s.
B x subjs w. groups	116.06	23	5.05	

subjects under cooperative and competitive conditions.

Although the statistical analysis showed no order effects, the order of administration of the two sets of problems and the order of the orientation induced by instructions was controlled as much as possible. There were four possible combinations of order of administration of the sets of problems and of the instructions: cooperative instructions for set A followed by competitive instructions for set B; cooperative instructions for set B followed by competitive instructions for set A; competitive instructions for set A followed by cooperative instructions for set B; and competitive instructions for set B followed by cooperative instructions for set A. Subjects were randomly allocated to groups of five, six or seven, the size of the groups depending upon the number of subjects available at each school. The groups were then randomly assigned to one of the four possible combinations of order of administration of set of problems and of instructions, with the limitation that an approximately equal number of subjects be assigned to each combination. The allocation was also limited by the ethnic composition required for the groups - Maori, European and mixed. The mixed composition was included to see if working in an ethnically mixed group had any effect upon performance. The final allocation of

subjects was as shown in Table 3. The distribution of subjects over the four combinations was not even, but this was unavoidable, since absenteeism, the fact that subjects had to be tested within their schools, and the limitation of group ethnic composition, meant that it was very difficult to obtain an equal cell distribution.

Each subject solved one set of problems under each of the two orientations, cooperation and competition. In this way, differences resulting from differential ability of subjects were eliminated.

Table 3. Distribution of Subjects in Groups
for Measurement of Performance

Combination	Maori	European	Mixed		
			Maori	Eur.	
coop - comp A - B	6	10	1	5	22
coop - comp B - A	8	11	5	2	26
comp - coop A - B	8	9	5	6	28
comp - coop B - A	10	9	3	6	28
Total	32	39	14	19	104

Prisoner's Dilemma

For the PDG the subjects were randomly assigned to dyads within the limits imposed by the required ethnic composition of the dyads. There were 42 dyads altogether, 18 where both subjects were European, 11 where both were Maori, and 13 mixed dyads where one subject was Maori and the other was European. This is the number of dyads actually used in the statistical analysis - other dyads were run but had to be discarded because one or more of the subjects could not understand the game situation. The randomisation was not complete as the subjects could only be randomly assigned to dyads within their schools and also the rate of absenteeism frequently meant that one subject of a dyad was away and a substitute had to be used.

The apparatus for the PDG consisted of a table, two chairs, a screen, a bell, counters, three plates (one for each of the subjects and one for the experimenter), and red and blue self-adhesive spots. The screen divided the table in half length-ways and prevented the subjects, who were seated at either end of the table, from receiving visual cues from each other - although the subjects could not see each other while the PDG was in progress, they all knew who their partner was. The bell was used to indicate the commencement of each trial, and the counters,

kept in the plates, were used for scoring. The spots were used to help the children identify their left and right hands, a blue spot being placed on their left hands and a red spot on the subjects' right hands.

The payoff matrix used for the PDG, which was the same as that used by Meeker (1970) in her study of Kpelle tribesmen, is given in Table 4. The matrix satisfies the conditions for the PDG outlined in Chapter 2 (p.21). A length of 50 trials per game was decided upon following a pilot study in which ten pairs played the PDG, five dyads with 30 trials per game and five dyads with 50 trials per game. From inspection of the results obtained, a pattern of responding did not emerge until the latter part of the game and a 30-trial PDG was not of sufficient length for subjects to establish a pattern of responding. Therefore a length of 50 trials, which allowed the dyads to establish a response pattern, was selected.

Table 4. Payoff Matrix for the Prisoner's Dilemma Game

	B_1	B_2
A_1	$[+1, +1]$	$[-2, +2]$
A_2	$[+2, -2]$	$[-1, -1]$

A trial by trial record was made for each dyad's game and, following the suggestion of Rapoport and Chammah (1965), the number of cooperative responses was calculated for dyads rather than for individual subjects although the individual scores were calculated when the effect upon cooperation of a mixed dyad was considered. A subtype of cooperative response which will be considered was noticed in the Prisoner's Dilemma games conducted in the pilot study and in the games during the actual experiment - the response where a subject follows a defecting response by his partner on the previous trial with a cooperative response on the next trial.

Procedure

The majority of the children were taken from their classrooms twice, the first time for the measurement of performance and the second time for the measurement of cooperative tendency. It was considered preferable that the subjects played the PDG after they had been tested for performance under the two orientations as it would be more enjoyable for the children and would also yield a higher reward. They were rewarded for participating in both parts of the experiment but the reward was smaller in the performance section. If the PDG had been played first the larger rewards could have meant that when the

children participated in the second part of the experiment and found that their possible rewards were smaller they would have been dissatisfied and possibly not have been as motivated to do well. Also, by conducting the PDG after the completion of the performance condition it was possible to tell the children that they would be wanted again to do something that was much more enjoyable for them, thus motivating them to be at school over the next few days and reduce the amount of absenteeism for the PDG part of the experiment.

For the measurement of performance, in which each group of children was tested separately, the children were seated around a table and were given the following instructions:

Do you know what equations are? I'm sure that you'll have done them in class. Have you? Good. The sort of equation I am going to give you here is one with two numbers and I want you to subtract one from the other, so one number is made less by the amount of the other number. Now, ...

Then, depending upon which condition the group was to work under first, either the instructions inducing a cooperative orientation or those inducing a competitive orientation were given.

Workie (1967) pointed out that it is not valid to compare groups where subjects are competing against each other with groups where subjects are cooperating together but competing against another group and label the latter condition as cooperative, saying that the results indicate the differences in performance under competitive and cooperative conditions. The latter condition obviously contains an element of competition. Consequently, in the instructions for the cooperative condition in the present experiment no reference was made to competition with other groups, the subjects being told merely that their group was to try and do as well as it could in an attempt to achieve a group total higher than a predicted total - that is, there was no sense of competing between groups introduced by the instructions.

For the competitive condition the experimenter told the subjects:

I've got a/another set of equations here. (This time) I want to see which one of you gets the most equations correct. I'm going to give you all the same lot of equations and I want to see how many of them each of you can solve correctly in five minutes. I'll be marking these equations and I'm going to see which one of you gets the most equations correct - the one who gets the most equations correct will win three lollies.

For the cooperative condition the following instructions were given:

I'm going to give you all a/another lot of equations. (This time) I want to see how many equations this group can solve correctly in five minutes. I want you to solve the equations by yourselves, but after you've done them I'll be marking them and then adding up the number of equations the people in this group get correct all together, so I can see how well this group can do - if the number of equations you get correct between you is more than the number I expect this group to get correct, I'll give the group some lollies - but that's only if you all do so well that the number of equations you get correct as a group is more than the number I expect you to.

The children were then given either set A or set B of equations to solve. In five minutes they were told to stop work and their papers were collected. The instructions for the other orientation were then given and a similar procedure, using the alternative set of equations, was followed. The first set of equations the children solved was marked while they were solving the second set and they were given the results after they had finished the second set. The second set was marked quickly while the children waited and they were then told the results. The subjects were then questioned to see if the two sets of instructions had been successful in establishing

the cooperative and competitive orientations intended. This questioning was not very successful as it was difficult to convey to the children what was meant by the question without being too explicit and divulging the hoped-for answer. The answers of approximately half the groups suggested that the instructions had succeeded but it is doubtful as to whether the children really understood what was being asked as there was a tendency to agree with whatever the experimenter said. On the other hand, it is not certain that the instructions were not successful in the other half of the cases, as their responses similarly could have been - and at times seemed to be - due to a lack of understanding of the nature of the question. However, in view of the doubt surrounding the success of the instructions, it can not be assumed that the two orientations were successfully established and the results of this part of the experiment are therefore not a good indication of performance under cooperative and competitive conditions.

In the cooperative condition, all subjects were rewarded for achievement of the group's goal, each individual in the group receiving the same reward, whereas in the competitive condition only one member of the group received a reward.

All the groups within a school were tested one after the other - this meant that the time required for this section of the experiment was minimised and the children, who were all asked not to tell others about what they had been doing, had less time in which to keep quiet about the experiment, a task which was expected to be somewhat difficult for the children.

In the PDG the subjects sat one at each end of a table which was divided in half by the screen. After the subjects were settled in pairs the following instructions were read out:

I want you to sit down here at this table - you can sit here and you can sit here. Right. Now, you both know which is your right hand and which is your left hand, don't you? Show me which is your right hand - that's it (corrected if necessary) - and now show me which is your left hand - that's it. Good. Just in case you can't remember, I'll put a red spot on your right hand and a blue one on your left hand. Like this - a red one on your right hand and a blue one on your left hand, and a red spot on your right hand and a blue one on your left hand. Now, each of you has a plate in front of you with some counters in it - you both have the same number of counters. The idea of this game is that you can lose some of those counters or get some more by raising your right or left hand - you can only put up one hand at a time. When I ring this bell, I want you both to put up one of your hands - remember,

only one of your hands. ++If you both put up your left hand - the hand with the blue spot on it - then you each get one extra counter, but if you both put up your right hand - the red spot - then I'll take one counter away from each of you. If one of you put up your right hand and the other puts up his left hand, then I will take two counters away from the person who puts up his left hand and give them to the other person - that is, the one who puts up his right hand. Do you understand that? Just in case you don't I'll explain it again. (The instructions were then repeated from ++.) OK? At the end of the game I'll count up the number of counters you have in the plate in front of you and for each two counters you have I'll give you one lolly - for each two (two fingers were held up) counters you have I'll give you one (one finger was held up) lolly. All right? Remember, you can only put up one hand at a time.

For each trial of the PDG the subjects were told which hand each subject had put up and for the first ten trials were asked alternately what should be done - that is, who should get counters and how many. It was thus possible to check that the subjects understood the nature of the game. There were several dyads where either one or both subjects were unable to comprehend the consequences of their raising their right or left hand and whose responses therefore could not be regarded as indicating a cooperative or a non-cooperative tendency - these dyads were eliminated from the results.

Another elimination criterion that was adopted was that of 50 responses where both subjects raised their left hands. In this situation the subjects did not experience a response where one subject cooperated and the other defected and therefore were not necessarily aware that in the latter situation the subject who defected gained more than when both subjects cooperated. As the possibilities of the game situation were not necessarily clear to these subjects, these dyads were eliminated - one European homogeneous dyad was eliminated from the statistical analysis for this reason.

Following the conclusion of the game, the number of counters each subject had left was established and the subjects were requested to refrain from telling anyone else what they had been doing. As in the performance section of the experiment, it was not expected that the subjects would all manage to keep quiet about what they had been doing but it was hoped that, as the performance section of the experiment took at the most one and a half days per school and the PDG section took about two days per school, the number of children being informed of the nature of the experiment before they participated would be small. Some children did tell their friends about the experimental situation but it is not known how many of the subjects had prior knowledge of the experimental

tasks. The information that a specific child had told his friends was mainly given by children who had previously participated in the experimental task, possibly at the same time as the child who had told his friends, and who were pointing out that although someone else had not kept quiet they themselves had not told anyone.

Statistical analysis

To analyse the performance under cooperative and competitive conditions, the scores of each subject under each of the two conditions was obtained. A normal distribution was assumed and a parametric statistical test was therefore appropriate, and a $2 \times 2 \times 2$ (ethnic origin \times group composition \times orientation) analysis of variance with repeated measures on the last factor was applied to the data.

For the analysis of results obtained from the PDG, the assumption of a normal distribution was also made and a parametric test - in this case the t test - was again appropriate. The number of cooperative (left-handed) responses was calculated for Maori and European groups and a t test for uncorrelated means was applied to the number of cooperative responses exhibited over 50 trials and also the number of cooperative responses over the last 25 trials, as it was expected that the response pattern would not become established until the latter half of the

game. The Maori dyads and the European dyads were compared.

Individual cooperative indices for 50 trials and for the last 25 trials were also calculated and the performance of Maori children in the homogeneous dyads was compared with that of the Maori children in the mixed dyads. Similarly, the performance of European children in homogeneous dyads was compared with that of European children in mixed dyads. Again, t tests for uncorrelated means were applied to the data to test for differences in performance between the various groups.

The other type of cooperative response, which has been mentioned previously (p.37) and exists where a subject follows a defecting response by his partner on the previous trial with a cooperative response, was also calculated for dyads and for individuals and a series of t tests for uncorrelated means was applied to the data. The same comparisons were made as in the case of the more straightforward cooperative responses where the number of left-handed responses regardless of the subject's partner's previous behaviour were calculated.

An additional method used to analyse the results obtained from the PDG was taken from Sibley, Senn, and Epanchin's (1968) study in which they looked at

the percentage of trials falling into the four dyadic outcome possibilities - cooperation-cooperation, cooperation-defection, defection-cooperation, and defection-defection - for each of the subgroups in their experiment. In this study the cooperation-defection and defection-cooperation possibilities were classed together. This section of the analysis was not conducted to investigate any particular hypothesis - rather, the aim was merely to see if any additional information could be obtained.

CHAPTER 4

RESULTS

Hypotheses 1 and 2

An analysis of variance was applied to the results obtained from the measurement of performance under cooperative and competitive conditions. As can be seen from Table 5, which gives the results of the analysis, only the ethnic origin of the subjects showed a significant effect ($p < .001$), the European children solving a significantly greater number of subtraction equations correctly than the Maori children. The lack of significant interaction between factors A and C in the analysis of variance table (ethnic origin and the condition under which the subjects worked, cooperation or competition) confirms the null hypothesis for Hypothesis 2 - that is, the Maori children did not solve a significantly greater number of equations correctly in a cooperative social situation as opposed to a competitive social situation than did the European children.

Hypothesis 1 is not tested directly by any one value in Table 5. However the lack of significant difference between the performances of all subjects - both Maori and European - under the two induced social situations, and the lack of significant interaction

Table 5. Analysis of Variance Table for
the Performance of Subjects in
Cooperative and Competitive Social
Situations

Source of variation	SS	df	MS	F
<u>Between subjs</u>	22043.73	<u>207</u>		
A (ethnic origin of subjects)	707.77	1	707.77	17.84*
B (group composition)	24.21	1	24.21	0.61
AB	2.50	1	2.50	
Subj w. groups (error (bet))	8092.91	204	39.67	
<u>Within Subjs</u>	646.5	<u>208</u>		
C (condition)	1.42	1	1.42	0.45
AC	3.16	1	3.16	1.01
BC	3.59	1	3.59	1.14
ABC	1.72	1	1.72	0.55
C x subj w. groups (error (within))	639.82	204	3.14	

* $p < 0.001$

between ethnic origin and the social situation induced by the instructions indicate that the two social situations did not differentially affect the performances of subjects when the results obtained from the entire sample, including both Maori and European subjects, were considered, and that the effect upon performance of working in a cooperative social situation as compared to a competitive social situation did not differ between the two ethnic groups. Therefore, Hypothesis 1, that Maori children will perform significantly better in a cooperative social situation than in a competitive social situation, was rejected. The lack of difference between the two ethnic groups implies that the lack of difference between performance under cooperative and competitive social situations applies to both the European and the Maori subjects when they are considered separately. The only other way in which the effect upon performance of a cooperative and a competitive social situation could be nonsignificant is if the Maori subjects showed an improved performance under one type of social situation and the European subjects showed an improvement under the other type of social situation. In this case, the differences occurring in the two ethnic groups would cancel each other out and the analysis would therefore reveal no difference between

the two conditions over the entire sample. This latter situation is not the case, however, as the analysis shows that there is no significant difference between the performance of the two ethnic groups under the two conditions of cooperation and competition. The decision to reject Hypothesis 1 is also based upon the results of an a priori t test applied to the data. This t test compared the performance of the Maori subjects in the cooperative and the competitive working situations. The obtained value of t failed to reach significance (see Table 6).

Hypothesis 3

To test Hypothesis 3, that Maori children will exhibit a significantly greater level of cooperative behaviour than European children, the cooperative

Table 6. Mean Performance Scores of Maori Children in Cooperative and Competitive Social Situations

	Mean	
Cooperation	9.17	t = 0.71 n.s.
Competition	8.91	

$$t^2 = \frac{(\bar{X}_1 - \bar{X}_2)^2}{s_w^2(n_1 + n_2)/n_1n_2} \quad (\text{Ferguson, 1966, p.296})$$

responses of the Maori dyads and the European dyads were compared. Four 1-tailed *t* tests were performed - two comparing the number of cooperative responses exhibited by the Maori dyads and the European dyads over 50 trials and over the last 25 trials, and two comparing the number of cooperative-following-defection responses by the Maori dyads and the European dyads over 50 trials and over the last 25 trials.

Figures 1 and 2 are graphical representations of the number of cooperative responses exhibited by the dyads over 50 trials in 5-trial blocks. As can be seen from Figure 1, the Maori dyads, instead of showing more cooperation than the European dyads as predicted, actually showed less cooperation. From Tables 7 and 8, which give the results of the *t* tests

Table 7. Mean Number of Cooperative Responses over 50 Trials of the PDG by Dyads

	Mean	S.D.	
Maori dyads	23.64	18.96	$t = -1.41$ n.s.
European dyads	33.00	11.48	

Table 8. Mean Number of Cooperative Responses over the Last 25 Trials of the PDG by Dyads

	Mean	S.D.	
Maori dyads	8.45	8.33	$t = -1.91$ $0.10 > p > 0.05$
European dyads	14.59	7.33	

Fig. 1. Cooperative Responses of dyads
per 5-trial Block

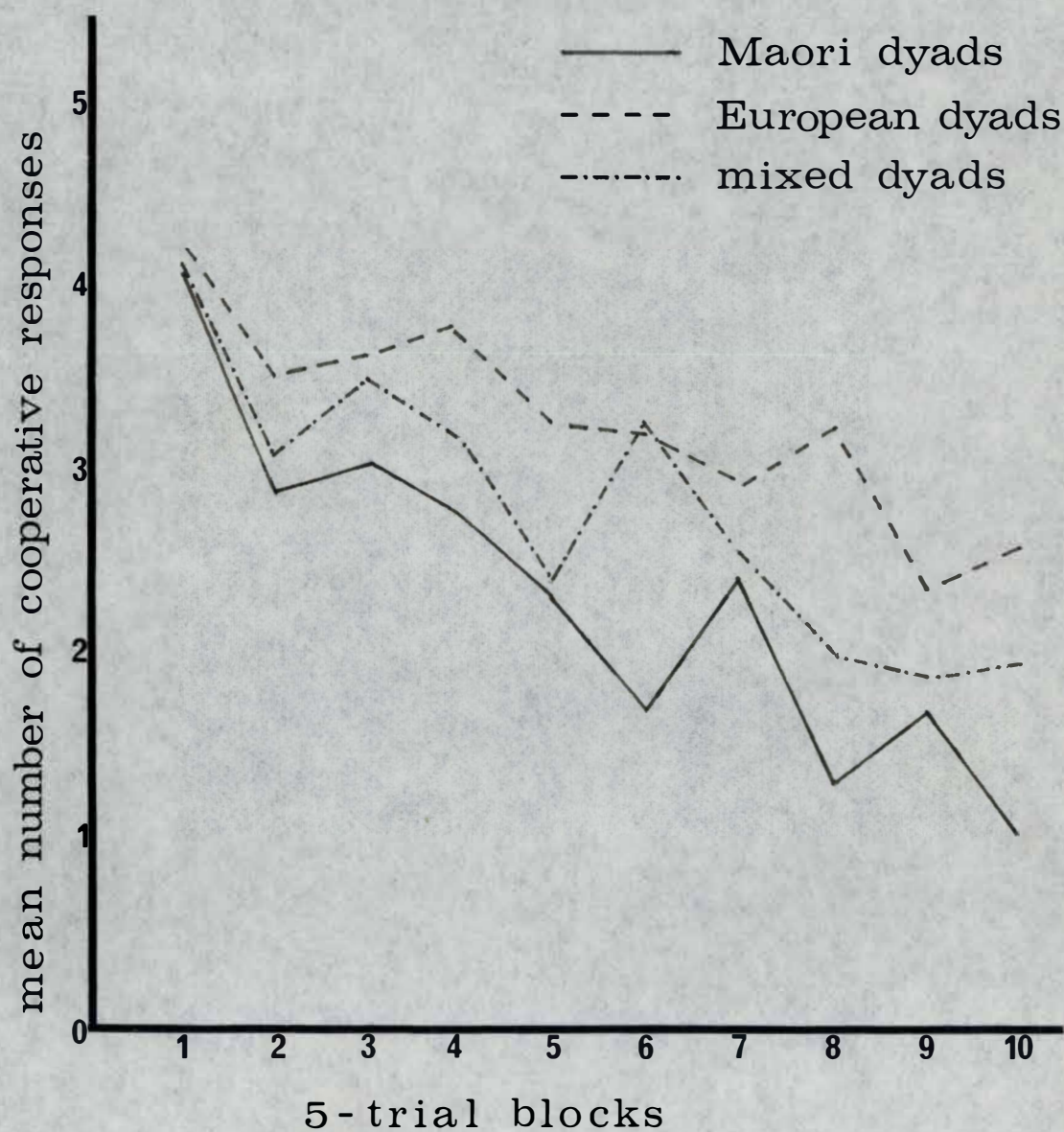
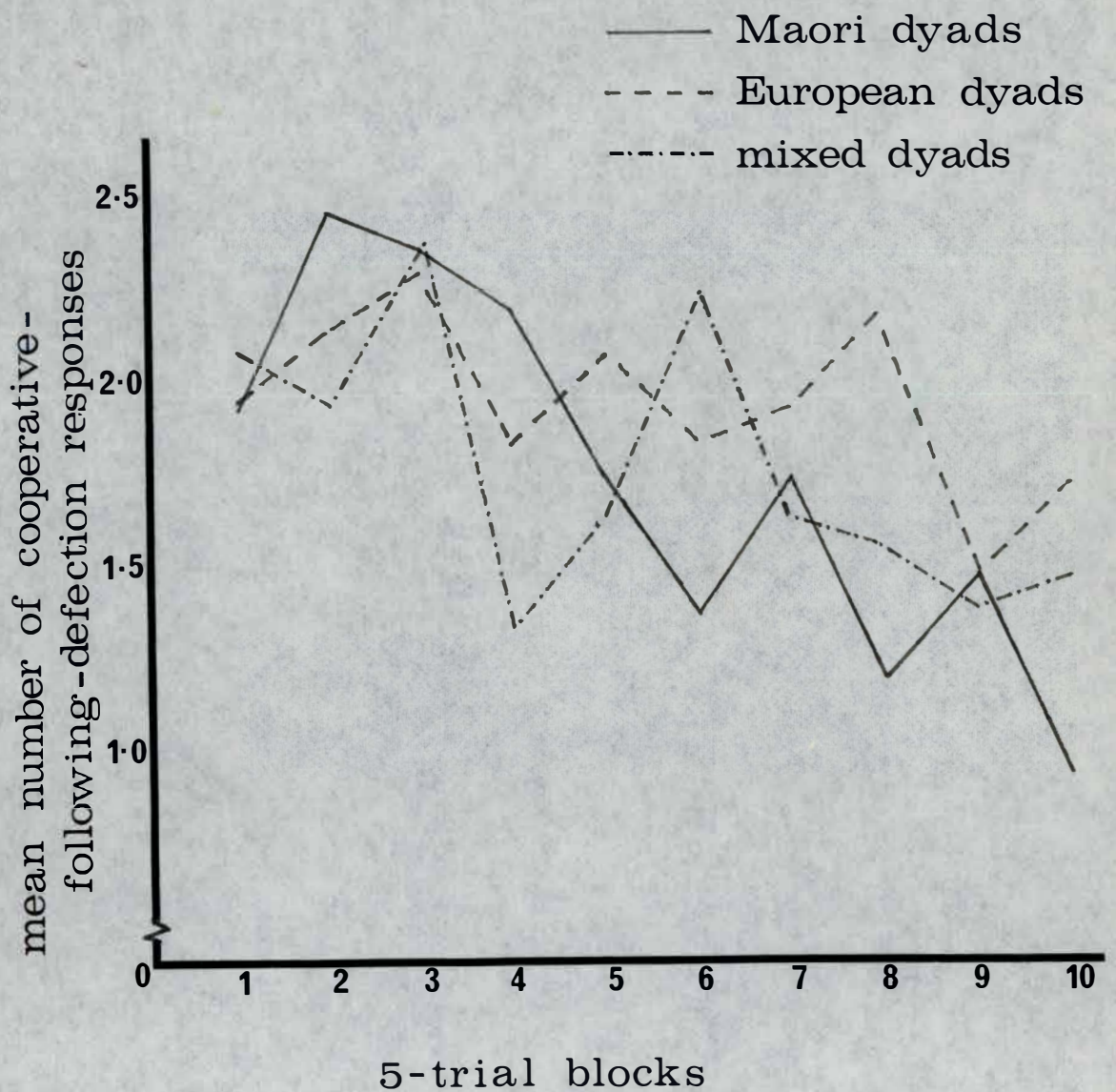


Fig. 2. Cooperative-following-defection
Responses of dyads per
5-trial Block



applied to the data, it can be seen that the differences between the cooperative behaviour of the Maori and the European dyads failed to reach significance when either all 50 trials of the PDG were included in the analysis or only the cooperative behaviour on the last 25 trials was considered, although there is a nonsignificant trend for the European dyads to exhibit more cooperative behaviour than the Maori dyads over the last 25 trials of the game.

Figure 2 shows that, in the case of the cooperative-following-defection responses, there was a slight difference from the pattern of responding when all cooperative responses were included in the analysis in that for the first twenty trials the Maori dyads exhibited a slightly greater number of cooperative-following-defection responses than the European dyads. However, this difference did not continue over the entire game. Neither of the t tests applied to the data for cooperative-following-defection responses yielded a t value that approached significance (the results are given in Tables 9 and

Table 9. Mean Number of Cooperative-following-defection Responses over 50 trials of the PDG by Dyads

	Mean	S.D.	
Maori dyads	17.27	10.59	
European dyads	19.24	5.17	t = -0.55 n.s.

10.) Comparison of the position of the Maori dyads relative to that of the European dyads in Figures 1 and 2 and comparison of the mean number of cooperative and cooperative-following-defection responses by the dyads, given in Tables 7 and 9, shows that although the Maori dyads are still less cooperative than the European dyads when cooperation is measured by cooperative-following-defection responses (Maori dyads, $\bar{X} = 17.27$; European dyads, $\bar{X} = 19.24$), the difference is less than when the total numbers of cooperative responses are compared (Maori dyads, $\bar{X} = 23.64$; European dyads, $\bar{X} = 33.00$). Although the difference between the Maori and the European dyads in the total number of cooperative responses exhibited approaches significance for the last 25 trials of the game (Table 8) this difference decreases when the cooperative-following-defection

Table 10. Mean Number of Cooperative-following-defection Responses over the Last 25 Trials of the PDG by Dyads

	Mean	S.D.	
Maori dyads	6.64	6.18	
European dyads	9.12	3.18	$t = -1.18$ n.s.

responses over the last 25 trials of the game are considered (Table 10), the difference in the latter not even approaching the 0.05 significance level.

Thus, although there is a trend approaching significance for the Maori dyads to be less, rather than more, cooperative than the European dyads when the total cooperative responses for the last 25 trials are compared, no similar trend in support of this is found when the number of cooperative-following-defection responses exhibited over the last 25 trials is considered. It is therefore concluded that although the Maori dyads do not exhibit a greater amount of cooperative behaviour than the European dyads, as was expected, neither do they show less cooperative behaviour. That is, there is no difference in the amount of cooperative behaviour exhibited by homogeneous dyads of the two ethnic groups.

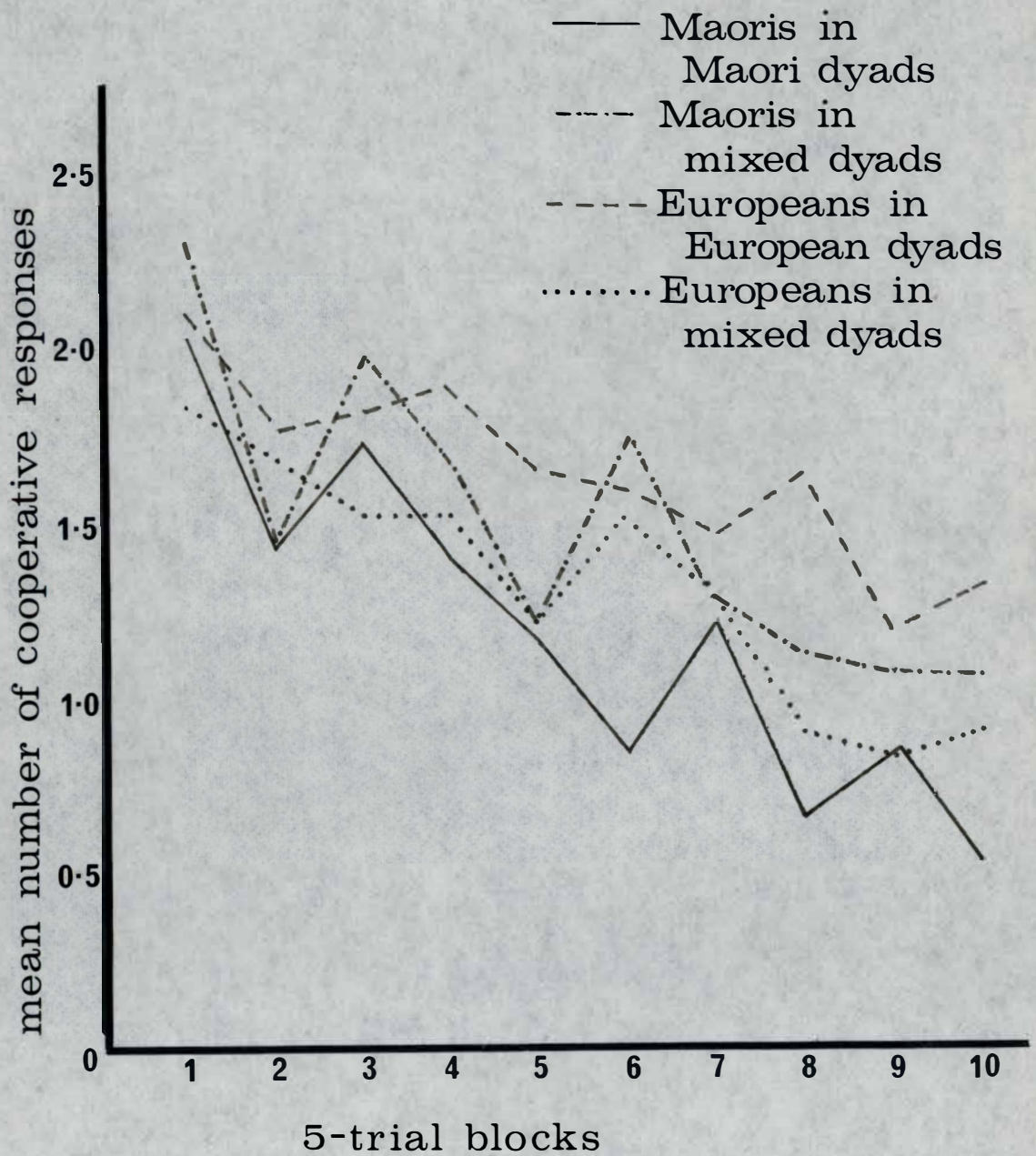
In the case of the ethnically heterogeneous dyads, Figures 1 and 2 indicate that for both types of cooperative responses the amount of cooperation exhibited by the heterogeneous dyads, as was anticipated, is less than that exhibited by the European dyads but more than that exhibited by the Maori dyads - that is, a compromise position was reached. The finding that the Maori dyads did not show a greater amount of cooperative behaviour than the European dyads

as was expected affects Hypotheses 4 and 5 in that the expected effects of participation in an ethnically mixed dyad as opposed to an ethnically homogeneous dyad, determined on the basis of the situation in the PDG, are now reversed. That is, Hypotheses 4 and 5 are not supported as they stand. However, it is worth while altering them in the light of the results relating to Hypothesis 3 and investigating the amended hypotheses. Hypothesis 4 now predicts that the Maori children in ethnically heterogeneous dyads will give a significantly greater number of cooperative responses in the PDG than Maori children in ethnically homogeneous dyads. Similarly, Hypothesis 5 now predicts that the European children in mixed dyads will give a significantly lower number of cooperative responses in the PDG than European children in ethnically homogeneous dyads.

Hypothesis 4

Figure 3 shows that, as the revised version of Hypothesis 4 predicts, there is a tendency for Maori children in ethnically mixed dyads to be more cooperative, as measured by the total number of cooperative responses given, than Maori children

Fig. 3. Cooperative Responses of
Individuals per 5-trial Block



in ethnically homogeneous dyads. However, Tables 11 and 12 show that this difference does not reach a significant level when either the 50 trials of the PDG or the behaviour exhibited over the last 25 trials are considered. Figure 4 shows that a similar trend exists when cooperative-following-defection responses are considered, but again the difference does not

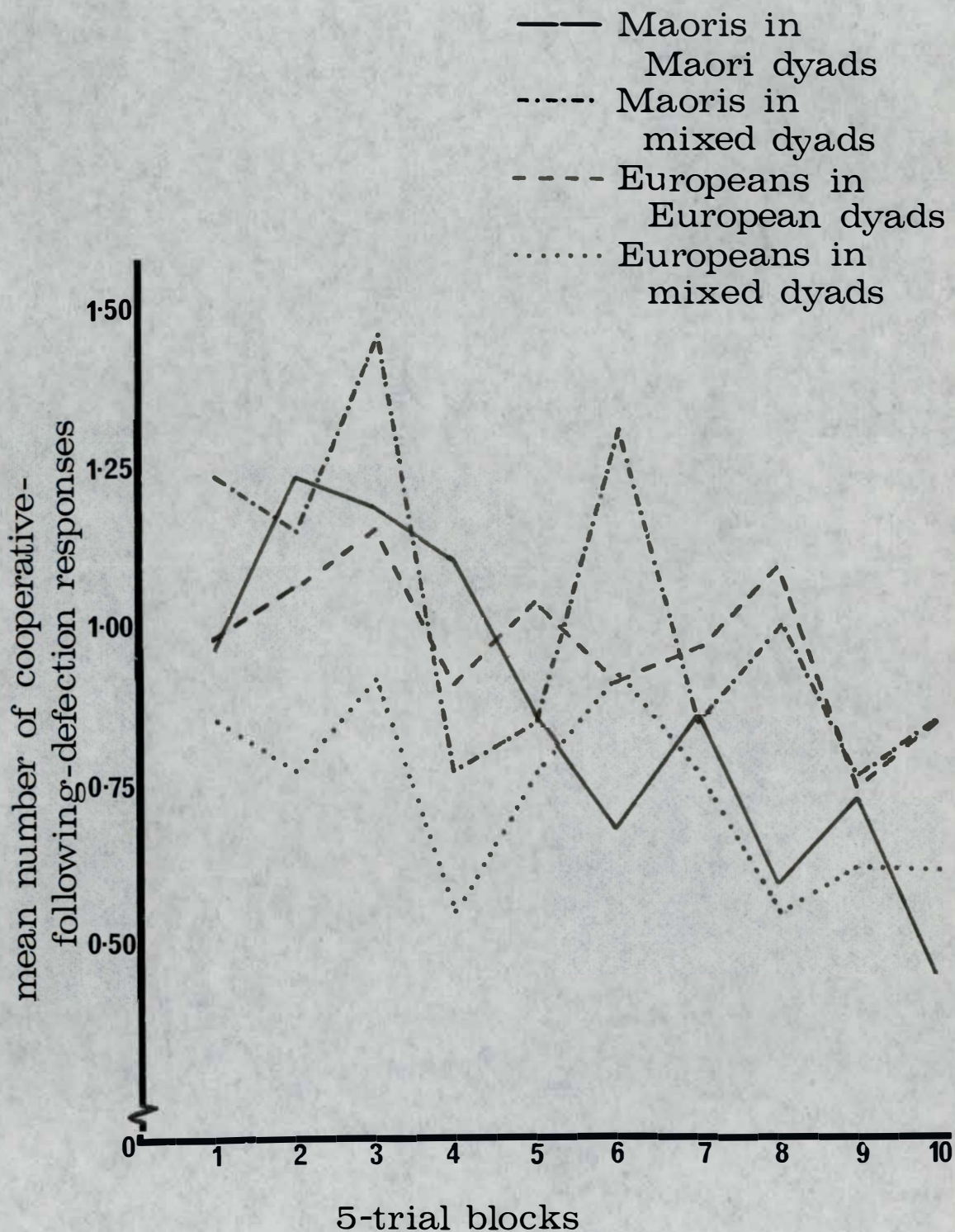
Table 11. Mean Number of Cooperative Responses over 50 Trials of the PDG by Maori Children

	Mean	S.D.	
Homogeneous dyads	11.82	7.61	$t = -1.18$
Mixed dyads	15.38	8.74	$0.25 > p > 0.10$

Table 12. Mean Number of Cooperative Responses over the Last 25 Trials of the PDG by Maori Children

	Mean	S.D.	
Homogeneous dyads	4.23	4.58	$t = -1.21$
Mixed dyads	6.38	5.09	$0.25 > p > 0.10$

Fig. 4. Cooperative-following-defection
Responses of Individuals
per 5-trial Block



approach significance (Tables 13 and 14).

Hypothesis 5

Figure 3 indicates that, as predicted by the revised version of Hypothesis 5, the European children in ethnically mixed dyads exhibited a smaller number of cooperative responses than

Table 13. Mean Number of Cooperative-following-defection Responses over 50 Trials of the PDG by Maori Children

	Mean	S.D.
Homogeneous dyads	8.64	6.23
Mixed dyads	10.46	5.93

$t = -0.86$ n.s.

Table 14. Mean Number of Cooperative-following-defection Responses over the Last 25 Trials of the PDG by Maori Children

	Mean	S.D.
Homogeneous dyads	3.32	3.52
Mixed dyads	4.77	4.00

$t = -1.05$ n.s.

European children in homogeneous dyads. However, as Tables 15 and 16 show, this small but consistent difference does not reach significance when either the 50 trials of the PDG or the last 25 trials are considered. This predicted difference is also apparent when the cooperative-following-defection responses of Europeans in homogeneous and mixed dyads are compared (Figure 4) but again this difference does not reach significance

Table 15 Mean Number of Cooperative Responses over 50 Trials of the PDG by European Children

	Mean	S.D.	
Homogeneous dyads	16.5	6.45	$t = 1.26$
Mixed dyads	13.31	7.88	$0.25 > p > 0.10$

Table 16. Mean Number of Cooperative Responses over the Last 25 Trials of the PDG by European Children

	Mean	S.D.	
Homogeneous dyads	7.29	4.15	$t = 1.19$
Mixed dyads	5.54	4.45	$0.25 > p > 0.10$

and although the difference approaches significance when the behaviour of the two groups over the 50 trials of the PDG is compared (Table 17) the difference decreases and does not even approach significance when the behaviour of the dyads over the last 25 trials of the PDG is considered (Table 18).

Thus, although Hypotheses 4 and 5 were not supported in their original form, there is some degree of support, although very slight and nonsignificant, in their revised forms.

Table 17. Mean Number of Cooperative-following-defection Responses over 50 Trials of the PDG by European Children

	Mean	S.D.	
Homogeneous dyads	9.62	3.87	$t = 1.80$
Mixed dyads	7.31	3.79	$0.10 > p > 0.05$

Table 18. Mean Number of Cooperative-following-defection Responses over the Last 25 Trials of the PDG by European Children

	Mean	S.D.	
Homogeneous dyads	4.56	2.58	$t = 1.26$
Mixed dyads	3.46	2.59	$0.25 > p > 0.10$

Distribution of outcome possibilities

Another method of analysing results from the PDG, mentioned in Chapter 3 (p.47), is that used by Sibley, Senn and Epanchin (1968). Table 19 contains the percentage of trials for each dyadic subgroup falling into the three outcome possibilities and shows that, again, the ethnically heterogeneous dyads appear to reach a compromise position, the proportions of each type of response for these dyads being approximately mid-way between the proportions of the response types exhibited by the two groups of homogeneous dyads. The Maori and the European dyads made a similar percentage of cooperative-cooperative dyadic responses. The difference between the two groups emerges when the percentages of defection-defection and cooperation-defection responses are compared - the European dyads

Table 19. Percentage of Responses in Each Type of Outcome Possibility by Dyads

Dyad	CC	DD	CD/DC
European	12.94	46.35	40.59
Maori	10.54	63.08	26.36
Heterogeneous	11.99	54.93	33.08

made an approximately equal number of defection-defection responses and cooperation-defection responses but the Maori dyads made twice as many defection-defection responses as cooperation-defection responses. This suggests that the subjects in the Maori homogeneous dyads, while not significantly less likely than the subjects in the European homogeneous dyads to give cooperation-cooperation responses, showed a greater tendency to give defection-defection responses in preference to cooperation-defection responses than the European dyads - that is, the subjects in the Maori homogeneous dyads were less likely to persist with cooperative responses when their partner was not responding cooperatively than were the European subjects in homogeneous dyads.

CHAPTER 5

DISCUSSION

The findings of the present study indicate that the Maori middle-years child is neither more cooperatively oriented than the European middle-years child, as measured by game-playing behaviour on the Prisoner's Dilemma Game, nor performs better than the European child in a cooperative social situation as opposed to a competitive social situation. These results are surprising in view of the differences in the child rearing practices of the two ethnic groups outlined in Chapter 1. However, it is possible that differences between the two ethnic groups do exist but that the design of the present study was not adequate enough to show up these differences. ✓

The section of the study designed to investigate performance in cooperative and competitive social situations, for example, was inadequate because, as has been mentioned in Chapter 3 (p.41), it is doubtful whether the instructions succeeded in establishing cooperative and competitive orientations in the subjects. The lack of a significant difference, in any direction, between the performance under cooperative and competitive conditions in the sample overall could be because the two conditions do not affect

performance differently - the findings of previous studies in this area have not provided any definite answer to the question of whether cooperative and competitive social situations affect performance differently. Deutsch (1951) and Haines and McKeachie (1957), for example, found that while group productivity, measured in an educational setting in both studies, was increased when the groups were working under a cooperative grading system compared to their performance when they were working under a competitive grading system, the performance of the individuals in the groups did not differ significantly between the two grading systems. However, the questioning of the subjects following the completion of this section of the experiment did not clearly indicate that the instructions had successfully established the desired orientations. It did not succeed in revealing the way the subjects actually viewed the situations - whether they felt that they were all working together as a group in the cooperative situation or that they were trying to do better than the others in the group in the competitive situation. Therefore the results of this portion of this study are not acceptable as evidence that Maori children do not perform better in a cooperative situation in comparison to a competitive situation, and that the performance of Maori children does not show an

improvement in a cooperative social situation as compared to a competitive social situation that is greater than that shown by the European children. As no definite conclusions about the performance of Maori children in cooperative and competitive social situations can be made from the present results, more information from other studies investigating this aspect is required before any decisions can be made about the effect of cooperative and competitive working conditions upon performance. However, the present results do suggest that there are no differences between the performances of Maori and European children in cooperative and competitive working situations and that the differences in the achievement motivation of the two ethnic groups, proposed by some writers (Earle, 1958, Beaglehole and Ritchie, 1958) therefore do not exist. Earle (1958) suggests that the Maori child limits his achievement to levels that are acceptable to his peer group and there is consequently no strong drive for personal achievement. The expected effect of this is that the Maori child is inhibited in a competitive situation and his performance should therefore be better in a cooperative situation where personal achievement is not involved. The European, on the other hand, is freer to compete than the Maori child and a cooperative working situation is not expected to

improve the performance of the European as much as that of the Maori, if at all. However, the present results suggest that this is not the case and that there are no differences in the achievement motivation of the two ethnic groups.

The information on level of cooperative behaviour obtained from the Prisoner's Dilemma Game section of the experiment showed that the Maori middle-years child's greater dependency on his peer groups in comparison to that of the middle-years European child who is, unlike the Maori child, still closely involved with his family, did not have the anticipated effect on the level of cooperative behaviour exhibited by the Maori child as compared to that of the European child. It is important to note that although the Maori children were not more cooperative than the European children, neither were they less cooperative. There was no difference in the amount of cooperative behaviour displayed by the two ethnic groups. The failure of the Maori children to behave as hypothesised and choose to make cooperative responses more frequently than the European children when presented with a choice between cooperative and noncooperative behaviour concurs with Jane Ritchie's (1957, p.130) observation that when the Maori children in her sample were given sweets after they had participated in the experiment, the children, instead of sharing their

sweets with their friends, were very active in keeping their sweets for themselves and preventing the other children from having them.

These results do not necessarily mean that the peer group dependency of the Maori middle-years child never affects the Maori child in such a way as to produce greater cooperation by the Maori child than is exhibited by the European middle-years child in the same situation. It is possible that although the Maori children will choose to act noncooperatively if given the opportunity, this choice is not always available to them. Pressure from the child's peer group, to which the Maori child is said to be more vulnerable than the European child because of the former's greater dependency upon the peer group for security, may only be exerted in a demand for cooperative behaviour in certain situations - in situations relevant to the group life, for example. The Maori child is therefore possibly more likely to behave cooperatively in response to group pressure in a situation relevant to the group life than is the European child who does not depend upon his peers for approval and security to the same extent.

The task employed in the present study to measure the amount of cooperation exhibited by the two ethnic groups - the Prisoner's Dilemma Game - was possibly not of sufficient relevance to the subjects

to constitute a situation in which peer approval was affected by the subject's behaviour in the game. The subjects may not have considered the situation to be in any way related to the activities of their groups and, therefore, not viewed their behaviour in the game situation as affecting their standing in their peer group. Also, as the subjects were selected and paired randomly, the subjects were not necessarily paired with someone who was in the same gang as themselves - this applies to both the Maori and the European dyads, of course. The possible significance of this is that the situation involved - the Prisoner's Dilemma Game situation itself and the subject's partner - may have been largely irrelevant to the subjects and the Maori child's greater need for peer group approval may not have had any influence on the subjects' behaviour. The expected cooperativeness of the Maori may, for the age group considered in this study, be limited to the child's immediate gang associates and then only in situations relevant to the gang life.

This suggests that although the Maori children did not behave more cooperatively than the European children in the present study, they could do so when the task involved is in some way relevant to their group life so that social pressure from the subject's peer group will have an influence on the subject's

behaviour. The Maori subjects might also behave more cooperatively when they are in the experimental situation with other members of their particular peer group rather than with children they know only slightly. Although the extent to which dyad members knew their partners may have been only slight, this knowledge was possibly sufficient to divest the game situation of much of its ambiguity. The subjects may not have been motivated to act in a socially approved manner and therefore, in the case of the Maori child, to cooperate. Their relationship with their partner had already been established and the Maori subjects consequently felt freer to behave non-cooperatively than if they had been paired with someone they did not know previously. The experimental situation in the latter case would be the first opportunity they had had to establish a relationship and the subjects would be uncertain as to how to behave in relation to their partner. In this ambiguous situation the social bias to cooperate, which is said to be a characteristic of Maori culture, might be observed.

Thus, although the results of the present study show that there is no difference in the general amount of cooperative behaviour exhibited by Maori and European children, it is possible that there are certain situations where differences in the level of coopera-

tion of the two ethnic groups do exist. Nevertheless, the major finding of the present study is that, contrary to expectations, Maori children do not in general exhibit a higher level of cooperation than European children of the same age.

The findings of this study regarding the level of cooperative behaviour displayed by subjects in ethnically homogeneous and ethnically mixed dyads supports the idea that when representatives of two groups differing in some characteristic mix on the basis of that characteristic, then a compromise position is reached. The change in the level of cooperative behaviour from a homogeneous dyad to a heterogeneous dyad was not significant for either the Maori or the European subjects but this was a function of the lack of significant difference between the levels of cooperative behaviour exhibited by the Maori and the European homogeneous dyads. If there had been a greater difference between the two groups of homogeneous dyads, then the compromise position reached by the Maori and European members of the heterogeneous dyads would probably have been more different from the positions of the two types of homogeneous dyads and might have been significant. The reaching of a compromise position by the mixed dyads can be, and has been (p.27-28), explained by the positively and negatively reinforcing responses

of the subject's partner and therefore the finding cannot be generalised to all situations involving cooperative behaviour by the people involved.

However, there is some evidence in the present data that when Maori and European children are working together the initial level of cooperation of each of the two ethnic groups will influence the level of cooperation of the other ethnic group in that situation. If there is a great disparity in the amount of cooperation shown by Maori and European children in some task involving cooperative behaviour, then the forming of ethnically heterogeneous groups could be used to produce a more even distribution of the degree of cooperation shown, if this was considered to be desirable. Before these results can be generalised, it is necessary that the effect of ethnically heterogeneous groups be investigated by some task in which the reaching of a compromise position is not explainable in terms of the task alone, as it is in the case of the Prisoner's Dilemma Game, but can be shown to be due to the fact of the members of the two groups working together.

Examination of the percentage of responses falling into each of the outcome possibilities is of considerable interest when the percentages of defection-defection and cooperation-defection/defection-cooperation responses made by the Maori and the European dyads are

considered. Defection in the Prisoner's Dilemma Game represents a decision to behave noncooperatively and protect oneself against possible loss rather than behave cooperatively and allow one's partner to choose between an outcome of mutual gain or of greater gain to the partner at the expense of the cooperator. The making of a defecting response can be described as a self-protective action intended to minimise one's own losses and one's partner's gains. The tendency of the Maori dyads to make twice as many defection-defection responses suggests that the Maori dyads were more responsive to the negative reinforcement of a cooperation-defection or a defection-cooperation response than the European dyads and made the change to the "safety" of a defection-defection response, in which both subjects lost one counter rather than one losing two counters and the other gaining two counters as occurred in cooperation-defection and defection-cooperation responses, more readily than the European dyads. The traditional child rearing practices of the Maori people, which have been regarded as encouraging cooperation among the middle-years children, also suggest that the Maoris are more affected by social reinforcement than Europeans. The reason for this is that the middle-years Maori children are more dependent upon their peer group for approval and security

than are the European children who still receive security from their home environment. The peer group is therefore more important to the Maori child than it is to the European child and the Maori child consequently may be more receptive to social reinforcement than the European child. The tendency for the Maori child to respond more quickly to negative reinforcement in the Prisoner's Dilemma Game supports this suggestion - the European children were more inclined to persist with defection-cooperation and cooperation-defection responses. The European dyads made approximately the same number of defection-defection and cooperation-defection/defection-cooperation responses, whereas the Maori children made twice as many of the former type of dyadic response. Maori children, once punished by a partner making a defecting response at the same time as they made a cooperative response, were less inclined to give cooperative responses in the future.

Suggestions for future research

This study leaves the question of the effect upon performance of a cooperative social situation as opposed to a competitive social situation on the Maori child and the European child still in doubt. There are two factors which should be considered in a further investigation into this matter. An important requirement is that the nature of the experimental

situation be such that the possibility of children failing to view the situation as cooperative or competitive be minimised as much as possible. One way of achieving this aim is for the experimental situation to be of considerable relevance to the subjects. Deutsch (1951) and Haines and McKeachie (1967) in their work with American college students, for example, manipulated a series of discussion sessions held over an entire college term. To establish the cooperative grading system, the subjects were told that the performance of the group as a whole was graded and all members of the group received the same grade and to establish the competitive grading system were told that the members within each group were ranked for their performance. This situation is not, of course, applicable to the age group used in this study, and also, it is difficult under these situations to obtain individual performance scores in the cooperative condition without losing the credibility of the situation - to say that the experimenter is interested in the group product and then to ask for separate work from each individual is rather contradictory. Also, Workie's (1967) recommendation that the cooperative situation involve no competitive element poses another restriction in that, as in the present experiment, the notion of simply cooperating in a group gives the situation an

unreal aspect as the subjects are accustomed to competing against other groups when working in groups. However, the experimental situation might be more successfully devised if the task was incorporated in the children's usual school programme over some period of time. In the present study the children were seen only once for, at the most, thirty minutes and the task had no relevance to their school work in that their performance on the task was not part of their school work. These two factors combined to produce a situation which was of very little importance and relevance to the children.

The friendship network of the children could also be utilised in further work in this area, as the effect of working with gang associates and non-gang associates upon the performance of Maori and European children would be worth investigating. The friendship networks could also be incorporated in the Prisoner's Dilemma Game situation in that the performance of Maori and European subjects when partnered by a member of the same gang as the subject and when partnered by someone who is not a member of the same gang as the subject could be investigated and compared. This would make it possible to determine whether the Maori children do behave more cooperatively toward fellow gang-members than do European children toward their fellow gang members or whether the Maori children behave more cooperatively in a more ambiguous situation.

REFERENCES

- AUSUBEL, DAVID P. Maori Youth. Price Milburn, 1961.
- BEAGLEHOLE, ERNEST, and BEAGLEHOLE, PEARL. Some Modern Maoris. New Zealand Council for Educational Research, 1946.
- BEAGLEHOLE, ERNEST, and RITCHIE, JAMES. The Rakau Maori studies. Journal of the Polynesian Society, 1958, 67, 132-154.
- BRUNING, SOMMER, and JONES. The motivational effects of cooperation and competition in the means-independent situation. Journal of Social Psychology, 1966, 68(2), 269-274.
- DEUTSCH, MORTON. A theory of cooperation and competition. Human Relations, 1950, 2, 129-152.
- DEUTSCH, MORTON. Social relations in the classroom and grading procedures. Journal of Educational Research, 1951, 45, 145-152.
- DEUTSCH, MORTON. Trust and suspicion. Journal of Conflict Resolution, 1958, 2(4), 267-279.
- DEUTSCH, MORTON. Effect of motivational orientation upon trust and suspicion. Human Relations, 1960, 13, 123-139 (a).
- DEUTSCH, MORTON. Trust, trustworthiness and the F scale. Journal of Abnormal and Social Psychology, 1960, 61(1), 138-140 (b).
- EARLE, MARGARET JANE. Rakau Children. Victoria University Publications in Psychology No.11, 1958.

- FERGUSON, G. A. Statistical Analysis in Psychology and Education (2nd ed.). McGraw-Hill Book Company, 1966.
- GUILFORD, J. P. Fundamental Statistics in Psychology and Education (4th ed.). McGraw-Hill Book Company, 1965.
- HAINES, D. B., and McKEACHIE, W. J. Cooperative versus competitive discussion methods in teaching introductory psychology. Journal of Educational Psychology, 1967, 58(6, Pt.1), 386-390.
- HARFORD, T., and CUTTER, S. Cooperation among Negro and white boys and girls. Psychological Reports, 1966, 18, 818.
- HOWARD, ALAN. Bishop Museum Community Research Program: A Progress Report. Unpublished paper, University of Hawaii, 1969 (?).
- HUDDLE, D. D. Work performance of trainable adults as influenced by competition, cooperation, and monetary reward. American Journal of Mental Deficiency, 1967, 72(2), 198-211.
- HURLOCK, E. B. The use of group rivalry as an incentive. Journal of Abnormal and Social Psychology, 1927, 22, 278-290.
- LUCE, R. D., and RAIFFA, H. Games and Decisions. Wiley, 1957.
- MADSEN, M. C. Cooperative and competitive motivation of children in three Mexican subcultures. Psychological Reports, 1967, 20, 1307-1320.

- MALLER, J. B. Cooperation and competition: an experimental study in motivation. Contributions to Education, 1929, No.384.
- MAY, M. A., and DOOB, L. W. Cooperation and competition. Social Science Research Council Bulletin, 1937, 25, 191.
- McCLINTOCK, C. G., and McNEEL, S. P. Cross-cultural comparisons of interpersonal motives. Sociometry, 1966, 29, 406-427.
- McCLINTOCK, C. G., and McNEEL, S. P. Prior dyadic experience and monetary reward as determinants of cooperative and competitive game behaviour. Journal of Personality and Social Psychology, 1967, 5(3), 282-294.
- MEAD, M. Cooperation and Competition among Primitive Peoples. McGraw-Hill, 1937.
- MEEKER, B. F. An experimental study of cooperation and competition in West Africa. International Journal of Psychology, 1970, 5(1), 11-19.
- METGE, JOAN. The Maoris of New Zealand. Routledge and Kegan Paul, 1967.
- NELSON, L., and MADSEN, M. C. Cooperation and competition in 4-year-olds as a function of reward contingency and subculture. Developmental Psychology, 1969, 1(4), 340-344.
- RAPOPORT, A., and CHAMMAH, A. M. Prisoner's Dilemma. University of Michigan Press, 1965.

- RAPOPORT, A., and ORWANT, C. Experimental games: a review. Behavioral Science, 1962, 7, 1-37.
- RITCHIE, JAMES. Basic Personality in Rakau. Victoria University Publications in Psychology, No.8, 1956.
- RITCHIE, JAMES. The Making of a Maori. A. H. & A. W. Reed, 1963.
- RITCHIE, JANE. Childhood in Rakau. Victoria University Publications in Psychology, No.10, 1957.
- RITCHIE, JANE, and RITCHIE, JAMES. Child Rearing Patterns in New Zealand. A. H. & A. W. Reed, 1970.
- SAMPSON and KARDUSH. Age, sex, class, and race differences in response to a two-person non-zero-sum game. Journal of Conflict Resolution, 1965, 9, 212-220.
- SHAPIRA, A., and MADSEN, M. C. Cooperative and competitive behaviour of kibbutz and urban children in Israel. Child Development, 1969, 40(2), 609-617.
- SIBLEY, S. A., SENN, S. K., and EPANCHIN, A. Race and sex of adolescents and cooperation in a mixed-motive game. Psychonomic Science, 1968, 13(2), 123-124.
- TEASDALE, R., and JOYNT, D. Some effects of incentives on the behaviour of adolescent retardates. American Journal of Mental Deficiency, 1967, 71(6), 925-930.

WHITTEMORE, I. C. The influence of competition on performance. Journal of Abnormal and Social Psychology, 1924, 19, 236-254.

WINER, B. Statistical Principles in Experimental Design. McGraw-Hill Book Company, 1962.

WORKIE, ABATNEH. The effect of cooperation and competition on productivity. Dissertation Abstracts, 1967, 28(1-A), 2343-2344.