

# Exploring the Influences of Individualism-Collectivism on Individual's Perceived Participation Equality in Virtual Learning Teams

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**Abstract.** This study aims to investigate the effects of equal participation on individual member's self assessment in terms of self-reported learning, self-perceived value of contribution, group identity and process satisfaction. Further, we examine how these effects of equal participation on individual learners are moderated by learners' cultural orientation in terms of individualism-collectivism. Data were collected from 65 virtual learning teams involving 195 undergraduates in a college in south China. MANOVA tests were performed to test the hypotheses. Findings revealed supportive results to most of posited main effects as well as moderating effects.

**Keywords:** Computer Supported Collaborative Learning (CSCL); e-Learning; Individualism-Collectivism; participation; learning outcomes.

## 1 Introduction

Thanks to the current advancement in the Information and Communication Technologies, e-learning has been found effective to support teaching and learning in today's information age [1]. The design and usage issues of e-learning are receiving unprecedented attention from not only computer scientists, but also educational psychologists, organization theorists and Information Systems (IS) professionals. In particular, institutions and educators are increasingly turning to a new paradigm emphasizing the use of e-learning to support computer supported collaborative learning (CSCL), in which a group of learners achieve meaningful learning through task completion and shared reflection in technology mediated environments [2]. Moreover, the emerging Web 2.0 turns out to be an enabling framework for institutions to support CSCL in virtual learning teams – the experience could better prepare learners to meet the contemporary demands towards globalization [3].

The notion of collective intelligence – which refers to the group decisions that tend to better than those prediscussion decisions of individual members – highlights the importance of the communication process and the collective knowledge building among learners in CSCL. Based on Social Interdependence Theory, the interaction among learners is crucial for the collaborative learning activities to be effective [4]. It has been found that computer mediated environments help to bring about greater

equality of participation of learners, but the learning outcomes vary with the characteristics of the individuals and groups [5]. In this regards, more research efforts are called for to understand the interlocking effects between equal participation and other group level and individual level characteristics. This study aims to investigate the effects of equal participation on individual member's self assessment in terms of self-reported learning [6], self-perceived value of contribution [7], group identity [8] and process satisfaction [9]. Further, we examine how these effects of equal participation on individual learners are moderated by learners' cultural orientation.

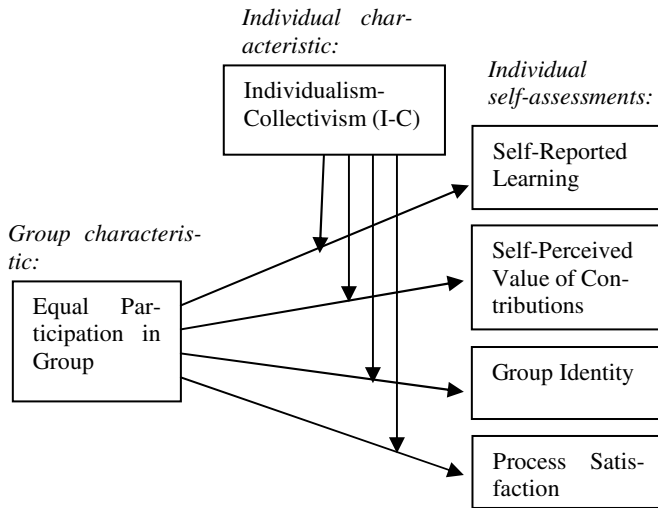
Users' culture orientation is a pertinent and salient concern in CSCL research, as it influences individual's cognitive process [10]. Study of individualism- collectivism (I-C) at the individual level is concerned with psychological and individual differences. Interaction effects between I-C and equal participation in group learning have been highlighted [11]. In this study, we focus on the I-C dimension, a cultural dimension that captures the relative importance people accord to personal interests and to share pursuits [10].

In this paper, sections 2 and 3 briefly review related theories and studies, derive a research model, and formulate research hypotheses. The research method is discussed in section 4. Sections 5 address data analysis. Discussion of results and implications are drawn in Section 6.

## 2 Theoretical Foundation

Contributed greatly by information and communication technologies (ICTs), the twentieth century dramatically changes the use of team structures by moving from centralized, collocated teams to virtual teams which bring together members across geographical boundaries [12]. Virtual teams rely primarily on ICTs to communication and collaborate. Research on the medium effects in CSCL has found that ICT tools enhance openness of opinion-sharing and help to bring about greater equality in participation by offering collective memory and structuring features [13, 14]. Cognitive activities among group members require access to collective memory and coordinate consensus building; the system features facilitate the interactions among group members to accomplish the assigned tasks. However, being dependent on technology with limited communication cues for coordination, virtual teams commonly face challenges in achieving collaboration effectiveness and member commitments. In addition to the technology features, characteristics of users and groups have been acknowledged to be associative notably with variations in interaction process as well as collaboration outcomes within the context of e-collaboration [15]. Particularly, antecedents affecting team members' commitment within virtual teams have little exploration in recent research [12]. The collaboration process is the heart of CSCL [16]. It has been highlighted by previous studies that the effect of collaboration learning should be more specific about the effects of particular activities involved in a learner's participation so as to gain better understanding of the underlying mechanisms [17]. Participation and contribution of group members are found to be pertinent predictors of group process success. The effects of equality in participation on group development and learning activities can be demonstrated by looking at interaction process [14, 18].

Individuals' behaviors and satisfactions in team contexts are joint manifestations of their cultural backgrounds and their evaluation about other members' contribution [19]. culture orientation referring to the basic beliefs, preferences or tendencies rather than to exhibited behaviors [20], are found to affect the way individuals make predictions about the interaction and subsequently the communication in the initial contacts [21]. Collectivism is defined as "a social pattern consisting of closely linked individuals who see themselves as parts of one or more collectives", while individualism is "a social pattern that consists of loosely linked individuals who view themselves as independent of collectives" [10]. In addition to explaining cross-culture difference, I-C also shows within-cultural variability and can be used in explaining individual differences pertaining to communication and collaboration [10, 22]. The cultural dimension, I-C, has been widely studied at the individual level to investigate the cultural orientation impacts on participants' perceptions prior to actual usage [20, 23, 24]; and these perceptions determine the intention to use a technology. Individual belief about their dependency with others (independent or interdependent) has been the key issues in these studies of individualism-collectivism [10, 25].



**Fig. 1.** The Research Model

### 3 Research Model and Hypotheses

Figure 1 depicts the research model. Socio-cultural theory, socio-constructivist theory and shared cognition theory are theories that establish the theoretical platform for collaborative learning [17]. These theories bring to light the two dominating aspects of outcome measures, affective and cognitive, which coincide with a learner's social-emotional and task-oriented activities respectively during the participation in the group learning process [26]. In other words, a learner's motivations, attitudes and feelings are directly affected by the interaction process [27]. In this study, equality of

members' participation is of interest to investigate the effects of the interaction process on members' learning outcomes. Dependent variables self-reported learning and self-perceived value of contribution are indicators of cognitive outcomes; on the other hand, group identity and process satisfactions are affective outcomes.

The most widely studied outcome measures are self-reported learning and satisfaction with the process [16, 28]. Self-reported learning (SRL) measures the extent to which students believe they have learnt in the course. Process satisfaction (PS) reflects both relational and procedural aspects of the group collaboration, and thus has been found to be affected by member contribution as well as participation [18]. Self-perceived value of contributions (SPVC) measures the degree to which participant feel that his/her input was valued by and influential to other group members [7]. Group identity (GI) refers to an individual's self-concept which derives from the emotional significance attached to a particular group membership [29], which refers to the membership of a virtual learning team in this study. The hypothesized relationships in the research model are derived in the remaining of the section.

### 3.1 Main Effects of Equality of Participation in Group

Group performance would benefit from the resources contributed by members; individual member's learning can be enhanced by considering the multiple perspectives shared in the group [4]. Members learn in their attempted questions and answers, as well as the evaluation of others' input during the collaborative process. Both the social-cultural theory and the social-constructivist theory have highlighted the importance of these forms of discourses in individual's cognitive development and learning outcomes. In other words, when the exchange of ideas is active among members by dynamically asking questions or expressing opinions, members tend to be engaged in both knowledge co-construction and socialization processes effectively [30]. The positive effects of active interactions among members on collaborative learning connote the importance of equality in group participation. Arguably, inequality in group participation hampers member's learning process. If members' participation is not equal (i.e., having someone dominate or free-ride the discussion), members are likely to miss out the chances in either clarify their doubts by asking questions or improve their ideas by receiving and replying to feedbacks from others. Therefore, equal participation is expected to result in higher self-reported learning. Similarly, thanks to the two way communications among members in groups with equal participation, individual member tend to perceive that their opinions are well received by others and incorporated into the group decision. Thus, equal participation tends to result in higher self-perceived value of contributions by individual members.

H1a: Members in groups with equal participation result in higher *self-reported learning* than those in groups with unequal participation.

H2a: Members in groups with equal participation result in higher *self-perceived value of contributions* than those in groups with unequal participation.

Also, equal participation has been found to lead members to feel emotionally fulfilled [9]. Based on equity theory [31], individual member tends to believe that other members' activities will reflect their degree of commitment towards the team, and this perceived relationship are equitably applicable to all members. If an individual believes

other team members' effort are sufficient and predictable, then trust, commitment and attachment can emerge within the team [12]. It is thus posited that equal participation would lead to higher group identity.

In CSCL, learner's process satisfaction is affected by how members work together, such as whether everyone does his/her part of the work, whether members remain on the task, and whether there is a good working atmosphere in the group [9]. Therefore, we hypothesize as following:

H3a: Members in groups with equal participation result in higher *group identity* than those in groups with unequal participation.

H4a: Members in groups with equal participation result in higher *process satisfaction* than those in groups with unequal participation.

### 3.2 Moderating Effects of I-C

Generally speaking, the attitude-behavior links are relatively weaker among collectivists than individualists [32]. The basic motive structure of individualists reflects their internal needs, rights, and capacities, while collectivists show a relatively high need for abasement, socially oriented achievement, and endurance. The effect of equal participation on self-reported learning is expected to be more significant among individualists than collectivists; equality is compatible with productivity, competition, and self-gain, hence it fits the values of individualists. Moreover, it is noted that collectivists tend to over-evaluate partner's performance and under-evaluate themselves [10]. Thus, the effect of equal participation on self-perceived value of contribution is less significant among collectivists.

H1b: The effect of equal participation on *self-reported learning* is expected to be more significant among individualists than collectivists.

H2b: The effect of equal participation on *self-perceived value of contributions* is expected to be more significant among individualists than collectivists.

Identity among collectivists is defined by relationship and group memberships; individualists define identity on what they own and their experiences. The emotions of collectivists tend to be other-focused and of short duration (i.e., they last as long as the collectivists are in a situation). Further, motivation is socially oriented among collectivists, and equality is associated with harmony and cohesion. Subordination of group goals to personal goals is the attribute distinguishing individualists from collectivists, and collectivists tend to accept unequal participation in group to a greater extent than individualists [11]. Hence, the effects of equal participation on group identity and process satisfaction are expected to be less significant among collectivists.

H3b: The effect of equal participation on *group identity* is expected to be more significant among individualists than collectivists.

H4b: The effect of equal participation on *process satisfaction* is expected to be more significant among individualists than collectivists.

## 4 Research Method

A lab experiment was conducted in this study, as it is appropriate for testing causal relationships among variables. Data were collected from undergraduate students enrolled in a college in south China. 195 subjects were assigned and allocated to 65 virtual learning teams (size=3); group members in each team did not know one another prior to the experiment. Subjects' average age was 20.6 years (s.d.=2.8); 101 were male. They are students from different faculties across the college. All teams were required to perform a group learning task about a lesson in identifying mushrooms [33].

A web-based CSCL system was developed and used in this study; it consisted of three components, reading materials, online quiz (i.e., the group task), and communication tools. Instructions were integrated and displayed in the system to guide subjects in completing the experiment according to the designed procedures. The experimental task required each learning group to hold discussions toward answering a quiz closely related to the reading materials. Each team was asked to submit a group report to answer the quiz questions. All communication and collaboration among members were requested to conduct in the system provided.

Prior to the experimental session, the subject completed a questionnaire aimed at ensuring no pre-experimental differences in terms of computer experience [34] and collaborative learning [35]. I-C was measured through questionnaires prior to the learning task and other dependent variables were measured by post-questionnaire. Next, the subject studied the materials provided by the system in an individual capacity, and then discussed with the other members to work in the quiz questions. To motivate their involvement, the top 20% among the groups will receive prizes. Participation was captured by communication log, and equality of group participation was measured by a peer-review approach [24]. Finally, the subject completed a questionnaire on the dependent variables; the measurements were adapted from previous validated scales.

Equal perception in group was measured by a peer assessment, in which subject were asked to allocate 100 points among all group members including themselves. They were asked to allocate the points in a manner reflecting the degree of effort contributed by each member in the discussion process. For each subject, their perception about equal participation in group is measured by the standard deviation of the three scores from 33 – the average score of a three person group. Higher deviation values indicated higher degree of *inequality* in group participation perceived by an individual. Moreover, it was noted that agreement about each individual's rating was quite high within groups, as indicated by a reliability estimate of 0.88 [24]. Based on the results, the 65 groups were classified into two categories: equal vs. unequal participation.

Based on the pre-experimental measurement about subject's I-C values (ranging from 2 to 7, s.d.= 1.36), subjects were categorized into two types: Individualists and Collectivists (matching method based on comparing against the mean value 4.68). After the categorization, MANOVA and ANOVA tests were conducted to test the research model.

## 5 Data Analysis and Results

Prior to the model testing, the measurement scales were examined in terms of the convergent validity and discriminant validity. The average variances extracted were above 0.50 for all constructs. Given that all constructs had items with loading above 0.60, and composite reliability scores as well as Cronbach's alpha above 0.7, we deemed the measurement items possessed adequate reliability. These results indicated that the convergent validity of the measurement model was fair. To ensure the discriminant validity, the squared correlations between constructs were found smaller than the average variance extracted for a construct.

MANOVA and ANOVA were performed to test the hypotheses. Table 1 summarizes the descriptive statistics on the dependent variables. Table 2 and 3 reports the MANOVA and the ANOVA results respectively. Revealed from the MANOVA and ANOVA results, hypotheses H1a, H2a and H3a are supported. Members perceived equal participation among members tended to report higher self-reported learning, self-perceived value of contribution, and group identity, as compared to those perceived unequal participation in their groups.

**Table 1.** Outcome variables: Mean (standard deviation)

	I-C	SRL	SPVC	GI	PS
Unequal Participation	I (n=31)	4.94 (.62)	5.13 (.80)	4.72 (.78)	5.05 (1.05)
	C (n=68)	5.70 (.77)	5.87 (.74)	5.43 (1.03)	5.55 (.90)
	Total	5.46 (.81)	5.64 (.83)	5.21 (1.01)	5.40 (.97)
Equal Participation	I (n=60)	5.85 (.75)	5.98 (.64)	5.85 (.62)	5.88 (.72)
	C (n=36)	5.96 (.58)	6.05 (.59)	5.81 (.72)	5.70 (.82)
	Total	5.89 (.69)	6.00 (.62)	5.83 (.66)	5.80 (.76)
Total	I (n=91)	5.53 (.83)	5.69 (.80)	5.47 (.86)	5.60 (.93)
	C (n=104)	5.79 (.72)	5.93 (.70)	5.56 (.95)	5.60 (.87)
	Total	5.70 (.78)	5.82 (.76)	5.51 (.91)	5.60 (.90)

**Table 2.** MANOVA test

Source	SRL		SPVC		GI		PS	
	MS	F	MS	F	MS	F	MS	F
EP	15.07	29.82**	11.44	23.53**	24.90	36.60**	10.18	13.78**
I-C	8.32	16.45**	7.21	14.84**	4.79	7.04**	1.10	1.49
EP*I-C	4.58	9.06**	4.98	10.26**	6.16	9.06**	5.11	6.92**

\*\* p<0.01      \* p<0.05

**Table 3.** ANOVA tests

Source	SRL		SPVC		GI		PS	
	MS	F	MS	F	MS	F	MS	F
EP	7.50	14.77**	6.10	13.31**	8.21	11.92**	1.18	1.63
IC	.88	1.73*	.84	1.83*	.86	1.25	.82	1.13
EP*I-C	.50	.98	.84	1.84*	1.13	1.65*	1.20	1.65*

\*\* p<0.01      \* p<0.05

The ANOVA results implied joining effects of equal participation and members' I-C value, so further analysis was conducted to understand the moderating effects of members' I-C on the link between equal participation in group and the two dependent variables, namely self-reported value of contribution and group identity (i.e., H2b and H3b). Results supported H2b as the main effect of equal participation on self-reported value of contribution was found significant only among individualists ( $F=30.16$ ,  $p<0.01$ ) but not collectivists. Main effects of equal participation on group identity were found significant among individualists ( $F=56.60$ ,  $p<0.01$ ) and collectivists ( $F=3.88$ ,  $P<0.05$ ); H3b was supported.

## 6 Discussion and Concluding Remarks

Findings revealed supportive results to most of posited relationship, both main effects of equality participation and moderating effects of I-C. For both individualists and collectivist, members who evaluate the participation among all members as equal tend to result in higher self-reported learning than those evaluate the participation as unequal. This highlights the importance of cultivating a group norm of equal participation in virtual learning team; learners can enhance learning in the interaction process. Moreover, learners' cultural orientation has found to affect their self-evaluation and attachment to the virtual learning teams. The effects of equal participation in group have revealed to be more imperative on self-perceived value of contribution and group identity among individualists than collectivists. This connotes more or different contextual factors should be concerned in virtual learning teams formed by collectivists.

This study has several limitations. Subjects were recruited to work in a assigned team for a single session; future work should employ a longitudinal design to study the participation process. The use of subjects from the same country leaves room for future works. Lastly, this study focus on a single dimension of culture, comparative efforts shall involve related as well as other cultural dimensions in future studies.

This study adds insights to the current understating of CSCL and virtual learning teams. We have proposed and investigated a pertinent process variable, namely equal participation in group. This variable has been found influential to both cognitive and affective outcomes in CSCL. Moreover, this study can serve as a benchmark to inform cross-culture research in future. Besides theoretical implications, finding is also expected to provide practical insights. The lessons drawn would inform system designers and educators how to employ virtual learning teams in CSCL activities.

## References

1. Beekman, G., Quinn, M.: *Tomorrow's Technology and You*, 8th edn. Prentice-Hall, Upper Saddle River (2007)
2. Francescato, D., Porcelli, R., Mebane, M., Cuddetta, M., Klobas, J., Renzi, P.: Evaluation of the efficacy of collaborative learning in face-to-face and computer-supported university contexts. *Computers in Human Behaviors* 22(2), 163–176 (2006)
3. Overbaugh, R.C., Casiello, A.R.: Distributed collaborative problem-based graduate-level learning: Students' perspectives on communication tool and efficacy. *Computers in Human Behavior* 24, 497–515 (2008)



4. Johnson, D., Johnson, R.T.: New developments in social interdependence theory. *Genetic, Social, and General Psychology Monographs* 131(4), 285–358 (2005)
5. Lipponen, L., Rahikainen, M., Hakkarainen, K., Palonen, T.: Effective participation and discourse through a computer network: investigating elementary students' computer supported interaction. *J. of Educational Computing Res.* 27(4), 355–384 (2003)
6. Alavi, M.: Computer-mediated collaborative learning: an empirical evaluation. *MIS Quarterly* 18(2), 159–174 (1994)
7. Karakowsky, L., McBey, K.: Do my contributions matter? The influence of imputed expertise on member involvement and self-evaluations in the work group. *Group & Org. Management* 26(1), 70–92 (2001)
8. Terry, D.J., Hogg, M.A., White, K.M.: The theory of planned behaviour: self-identity, social identity and group norms. *British J. of Social Psychology* 38, 225–244 (1999)
9. Gunawardena, C.N., Nolla, A.C., Wilson, P.L., Lopez-Islas, J.R., Ramirez-Angel, N., Megchun-Alpizar, R.M.: A cross-cultural study of group process and development in online conferences. *Distance Education* 22(1), 122–136 (2001)
10. Triandis, H.C.: *Individualism and Collectivism*. Westview, Boulder, CO (1995)
11. Oetzel, J.G.: Self-construals, communication processes, and group outcomes in homogeneous and heterogeneous groups. *Small Group Res.* 32(1), 19–54 (2001)
12. Powell, A., Galvin, J., Piccoli, G.: Antecedents to team member commitment from near and far. *Inform. Tech. and People* 19(4), 299–322 (2006)
13. Orlikowski, W.J.: Using Technology and Constituting Structures: A Practice Lens for Studying Technology in Organizations. *Org. Sci.* 11(4), 404–428 (2000)
14. Daily, B.F., Teich, J.E.: Perceptions of contribution in multi-cultural groups in non-GDSS and GDSS environments. *European J. of Operational Res.* 134, 70–83 (2001)
15. Pissarra, J., Jesuino, J.C.: Idea generation through computer-mediated communication. *Journal of Managerial Psychology* 20, 275–291 (2005)
16. Dewiyanti, S., Brand-Gruwel, S., Jochems, W., Broers, N.J.: Students' experiences with collaborative learning in asynchronous Computer-Supported Collaborative Learning environments. *Computers in Human Behavior* 23, 496–514 (2007)
17. Dillenbourg, P., Baker, M., Blaye, A., O'Malley, C.: The Evolution of Research on Collaborative Learning. In: Reimann, P., Spada, H. (eds.) *Learning in human and machines. Towards an interdisciplinary learning science*, pp. 189–211. Pergamon, London (1995)
18. Burke, K., Aytes, K., Chidambaram, L.: Media effects on the development of cohesion and process satisfaction in computer-supported workgroups - An analysis of results from two longitudinal studies. *Information Technology & People* 14, 122–141 (2001)
19. Mohammed, S., Dumville, B.: Team mental models in a team knowledge framework: Expending theory and measurement across disciplinary boundaries. *J. of Organizational Behavior* 22, 89–106 (2001)
20. Alavi, S.B., McCormick, J.: Theoretical and measurement issues for studies of collective orientation in team contexts. *Small Group Res.* 35, 111–127 (2004)
21. Ji, L.J., Zhang, Z., Nisbett, R.E.: Is it culture or is it language? Examination of language effects in cross-cultural research on categorization. *Journal of Personality and Social Psychology* 87(1), 57–65 (2004)
22. Kagitcibasi, C.: Autonomy and relatedness in cultural context: Implications for self and family. *J. of Cross-Cultural Psy.* 36, 403–422 (2005)
23. Marcus, A., Gould, E.W.: Crosscurrents: cultural dimensions and global Web user-interface design. *Interactions* 7(4), 32–46 (2000)
24. Wagner III, J.A.: Studies of individualism-collectivism: Effects on cooperation in groups. *Academy of Management Journal* 38, 152–172 (1995)

25. Triandis, H.C., Gelfand, M.J.: Converging measurement of horizontal and vertical individualism and collectivism. *J. of personality and social psy.* 74, 118–128 (1998)
26. Jones, A., Issroff, K.: Learning technologies: Affective and social issues in computer-supported collaborative learning. *Comp. & Edu.* 44(4), 395–408 (2005)
27. Lepper, M.R., Woolverton, M., Mumme, D., Gurtner, J.: Motivational techniques of expert human tutors: Lessons for the design of computer-based tutors. In: *Proceedings of the 32nd HICSS*. IEEE Press, Los Alamitos (1993)
28. BenbunanFich, R., Arbaugh, J.B.: Separating the effects of knowledge construction and group collaboration in learning outcomes of web-based courses. *Information & Management* 43(6), 778–793 (2006)
29. Tajfel, H.: *Social identity and intergroup relations*. Cambridge University Press, New York (1982)
30. Williams, E.A., Duray, R., Reddy, V.: Teamwork orientation, group cohesiveness, and student learning: a study of the use of teams in online distance education. *J of Management Edu.* 30(4), 592–614 (2006)
31. Adams, J.S.: Inequity in social exchange. *Adv. Exp. Soc. Psychol.* 62, 335–343 (1965)
32. Kashima, Y., Siegel, M., Tanaka, K., Kashima, E.S.: Do people believe behaviors are consistent with attitudes? Toward a cultural psychology of attribution processes. *British J. of Social Psy.* 33(1), 111–124 (1992)
33. Lim, J., Zhong, Y.: The interaction and effects of perceived cultural diversity, group size, leadership, and collaborative learning systems: an experimental study. *Information Resources Management Journal* 19(4), 56–71 (2006)
34. Hilmer, K.M., Dennis, A.R.: Stimulating thinking in group decision making. In: *Proceedings of the 33rd HICSS*. IEEE Press, Los Alamitos (2000)
35. Ross, J.A.: The influence of computer communication skills on participation in a computer conferencing course. *J. of Educational Computing Res.* 15(1), 37–52 (1996)